RAILROAD GAZETTE

FRIDAY, JANUARY 8, 1904.

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Contributions

Friction Draft Gear.

Jan. 2, 1904.

TO THE EDITOR OF THE RAILROAD GAZETTE:

On page 875, your December 4 issue, you quote me in connection with the meeting of the St. Louis Railway Club on the "Life of Friction Draft Gear." In this quotation I am made to give a sweeping denunciation of friction draft gears, which I never intended and did not have in thought at the time of making these remarks in the St. Louis Club, and it is unfortunate that the stenographer's notes were not submitted to me for review before publication, as I had no thought of unqualifiedly condemning well known standard friction draft gears, which have proven their ability to accomplish that for which they have been designed and which service has proven them capable of accomplishing, and I trust, therefore, that you will please make this correction in your next issue. WILLIS C. SQUIRE.

[It is evident that fuller knowledge and a chance to revise the words spoken under the inspiration of a club meeting would have led Mr. Squire to cancel them altogether. Friction draft gear is accomplishing the full measure of safety and economy which the *Railroad Gazette* ascribed to it when it was first designed. The failures of parts have been so slight and so infrequent that they are negligible quantities.—EDITOR.]

Feed Water Heater for Locomotives.

TO THE EDITOR OF THE RAILROAD GAZETTE:

McBride's feed water heater, illustrated in the *Railroad Gazette* of July 17, looks very nice as a picture. But while I do not for a moment question the claims made for the economy of heating feed water, commonly accepted as 1 per cent. saving of fuel for each 10 deg. of heat added to fuel water, I do question the utility of the proposed method of getting the increased efficiency. The inventor says the proposed system involves little more than is not found in every day use in marine and stationary work. Very good, but who can, or will, compare marine and stationary work with the conditions existing in every day locomotive practice. While the device might work well in warm weather, any railroad man knows it would not have the same chance in cold weather, just the time when it would be of the most value. Imagine the pressure pump perched out on the running board of an engine making 45 miles an hour, the thermometer down to zero or below. The water in the tank is liable to be cold in such weather, and I am very much afraid it would not want to run up hill to the little pump if the latter was stopped for a few minutes. Or place the pump under the running board where it would be so handy (?) to get at, what advantage is gained? The pump suction will be an enclosed icicle in a very short time. It will not be advisable to heat the water in the tank for obvious reasons. In marine and stationary work, everything is lovely for such a device. In fact, no plant of any pretensions is without a good feed water heater, and the modern stationary plant is a perpetual summer. Take it in the south, the device would no doubt be all right, and while the heat efficiency might not be so much of an object the scale preventive feature would be quite an object in bad water districts particularly. A scheme on similar lines to that proposed by Mr. McBride (at least it has the same end in view, i.e., increasing the efficiency of the locomotive, by keeping down boiler repairs, etc.,) was proposed by the Master Mechanics' Association over two years ago. I have looked anxiously to see this in service, but am still looking for it. In concluding their report the committee say: "We had hoped to present to the convention results of a test made in regular service with the device just described, but on account of failure to get a satisfactory pump we are unable to make a service report, but hope at no distant date to be able to advise any inquiring member as to practical results obtained by the same." I often wonder if they have found it, a pump that would coax hot water up hill. The boiler feed pump is all right in its place, but its place is under cover, not out in zero weather, with dust and storms to hoodoo it.

J. V. N. CHENEY.

The Manhattan Bridge Design.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have noted in your issue of December 25 Mr. Lindenthal's comments on my communication in the *Gazette* of December 4, regarding the Manhattan Bridge. As to the technical points involved I cannot see that there is any need for further reply from me, as Mr. Lindenthal merely repeats the same arguments he has before produced and declines to meet the situation on the ground of facts and figures. It will devolve upon the new administration to sift the case in detail, and it is to be hoped that it will be duly settled without prejudice. While we must await this decision for any further settlement of the technical points in dispute, there are two points, one of which it is perhaps only fit, and the other which it is rather imperative, that I should allude to further.

Mr. Lindenthal says: "Several large bridge firms are ready to compete, on the basis of the present plans for the erection of the Manhattan bridge superstructure within 3½ years." In view of the fact that Mr. Lindenthal indulged in statements even more sanguine regarding the Blackwell's Island Bridge, for which he received but one bid at the first letting and two at the second, one of which was palpably a "straw bid"; and in view of the fact that he awarded the contract at prices which he pronounced outrageously extortionate and to a firm which he had charged with collusion and fraud, this statement is hardly likely to command credence, especially as he cautiously withholds the names of the "several large bridge firms" referred to.

Mr. Lindenthal further says: "Mr. R. S. Buck states that I intended to use my patented wire links for the chains, which I had proposed in the competitive plans for a railroad suspension bridge over the St. Lawrence River at Quebec. The correctness of that gratuitous statement I deny as I have denied it before." It is to be regretted that the personal element should thus be brought into the situation, but as it is done it must be met. I perhaps owe Mr. Lindenthal an apology for presuming to state what his intentions were, as I had no access to his mental processes and had only outward manifestations from which to judge his intentions. I fully realize the fact that it is possible to intend one thing and to appear to intend another. However, I think that, in the face of the following facts, what now appears to be my error was fully justified.

Mr. Lindenthal, shortly after coming into office, so strongly expressed his belief that wire link chains were the proper form of construction for the Manhattan Bridge that the impression was forced on me, and I believe on several others in the department, that these were to be adopted for this bridge. Reference to my diary shows the following extract under date of Jan. 4, 1902: "Discussed bridges No. 3 and No. 4 with Commissioner, who expressed anxiety to have his link cable scheme adopted. I requested him to bring his plans, which he promised to do on Monday." The plans referred to were those of the design made by Mr. Lindenthal for the Quebec bridge which were duly furnished, with what appeared a very clearly expressed injunction from the Commissioner to use them as a model for the design of the Manhattan Bridge. The impression remained undisturbed with me for some time, and, as far as I have been able to ascertain, with others in the department, that it was the intention of the Commissioner to use the wire link chains for the Manhattan Bridge.

In my diary under date of March 20, 1902, is the following: "Had conference with Com'r. La Chicotte being present, at which he instructed me to prepare plans for bridge No. 3 with wire links for cables." No mention was made, to my knowledge, of the use of any other form of link until after this date, and until after some other newspapers of New York had made considerable comment upon the supposed intention to use wire links patented by the Commissioner. I have been unable to find among several who were in a position to receive manifestations on the subject any recollection of mention being made by the Commissioner of nickel steel for these links until after the newspaper agitation referred to.

The foregoing are simple facts, and, I think, will furnish some excuse for my error regarding Mr. Lindenthal's actual intentions. R. S. BUCK.

Precipitating Depression.

Chicago, Dec. 31, 1903.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The terms Prosperity and Adversity are relative, the base of their measurement being a matter peculiar to the individual and locality. To some the price of a bushel of wheat is regarded as the most positive evidence of "good" and "bad" times. To others, the price of iron and steel is taken as a sure guide to the state of trade. Others see in the degree of activity of the railroads a form of measurement of the financial, agricultural, and commercial interests.

The foundation for the conclusion with respect to railroads is, of course, in the fact that without transportation, commerce would be limited to the small and restricted transactions of the village community. Hence, the quantity and value of that which is transported may rightly be regarded as a direct measure of the wealth in process of exchange; and it needs no argument to show that only in the exchange of commodities is there the possibility for commercial prosperity. Let the quantity or business of transportation be large, and the exchange of values is correspondingly great; let it be small, then commerce equally scanty, and the production of wealth similarly low.

In times of marked prosperity the innate quality of fear is lulled and in its place there is a general feeling of security. But let only the faintest of whispers be heard questioning the financial stability of some large controlling interest and at once there arise forebodings, dark and ominous; the sense of security is dampened, the one-time state of exhilaration and fearlessness is considerably reduced, and birth is given to thoughts pessimistical. This state of mind finds expression in the great ones of the world of finance. The sequence of events is direct—a stringency in money, and the rest follows in more or less rapid succession. Those furnishing money become alarmed. At once the word is given, "Shut down on all unnecessary expenses; reduce the number of men employed," and other like orders familiar enough to those who have lived through them.

The railroad, by reason of its direct and intimate relation with the financial world, is usually one of the first to experience this unhealthy condition; and because of the magnitude of the effect of a general order similar to the above, there is thus made possible every conceivable form of depression and the attendant evils. For while the elimination of this or that expense, and the discharge of so many hundreds or thousands of men may appear the one thing needful, the unfortunate part is that the matter does not end there; the action, once started, going on and on in a cumulative manner. The shutting down by the railroad of expenditures for supplies and improvements, while apparently a measure for good as constituting a reduction in expenses, results in a lessened amount of things to be made and, thus, a lessened quantity of things to be carried. Those in turn whose business it is to manufacture supplies and commodities for the railroad—the locomotive and car builders, rail-makers, and others—also take immediate steps to reduce their expenses, and this they do in much the same manner as the railroad did, and so on, spreading in widening circles and with increasing intensity.

All this through varying degrees of straitened circumstances and poverty until some bright element starts the wave current in the opposite direction, gladdening the face of the dispirited and quickening into life the capabilities of activity. And in good time activities are again in evidence, things are made, transported and exchanged, as they should be at all times.

It is clear that a railroad could not long exist if its business were confined to the transportation of its own purchased commodities and supplies. As well might one conceive of a rail mill producing rails solely for its own yard use. But because of the well-nigh incalculable extent to which railroads are bound up, concerned and associated, with the agricultural and commercial interests of the country it would seem only logical that those in control should exercise the wisest possible judgment before precipitating adversity. For the far-reaching effect is that all purchases—whether for trade, necessities, luxuries or pleasures—are minimized, and only that freight and passenger traffic is offered which cannot well be avoided. But even more than this: the deprivation by the railroad of so many of its people reduces the quality of maintenance and permits depreciation to the extent peculiar to properties which are suffering by more or less inaction in service and an absence of the necessary provision for maintenance. View it as one may, any reduction in proper and competent activities is a questionable process, and should not be lightly undertaken.

GEORGE WELSBY SCOTT.

[The railroads will try to be pace-makers, but pace-making loses its value, its suction, if it is too fast for those who follow.—ED.]

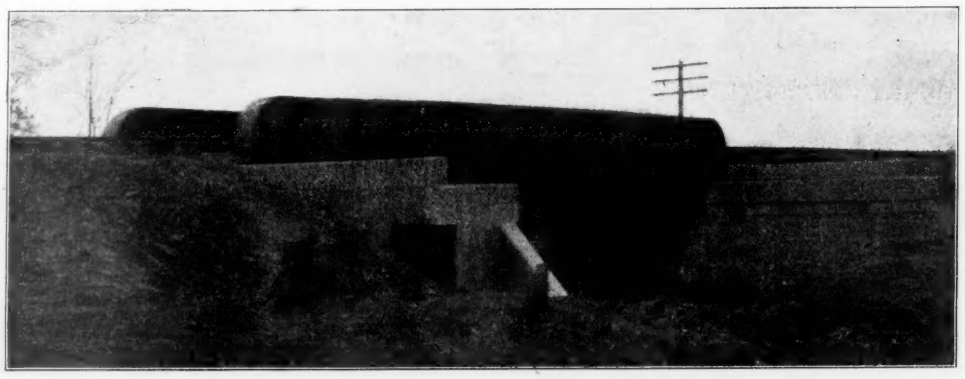
To reach the south end of the Simplon Tunnel the Italians are building a new railroad from Domo d' Ossola to Iselle, 13 miles long with an ascent of 1,170 ft. in that distance. To reduce the grade a spiral tunnel 9,696 ft. long, including one tangent 1,733 ft. long, is being constructed, with a curve of 1,635 ft. radius and a grade of 95 ft. per mile; the tunneling parties met near the middle Oct. 31, and the engineers are congratulating themselves that the center lines of the crooked thing coincided exactly.

Steel-Concrete Abutments and Solid Floors for Railroad Bridges.

By A. O. CUNNINGHAM, *Mem. Am. Soc. C. E.*
Bridge Engineer, Wabash R. R.

Few attempts have been made on radical lines to reduce the proportionately high cost of the masonry as compared with the cost of the steel work in railroad bridges of short span, a problem which has, however, been repeatedly presented to designers of such bridges. Nor have there been presented satisfactory designs for solid bridge floors which would not be affected by water, would not leak and would not be excessive in cost. At the request of Mr. W. S. Newhall, Chief Engineer of the Wabash, the writer prepared designs for some new bridges and their abutments to be built on the line of that road, which embody some new and interesting features. The accompanying illustrations show bridge No. 868, located south of Carpenter, Ill., on the middle division, and also two designs of solid floors, one for a deck girder span and the other for a through plate girder span.

The bridge at Carpenter, as at present constructed, is a single track plate girder span resting on concrete-steel abutments, 65 ft. 6 in. between parapets. As shown on the plan, the location of the new track is such as to permit the construction of the abutments and the placing of the girders without interfering with the traffic on the old line. The abutments have been built to accommodate a double track girder and in designing and erecting the steel work one light side girder and a heavy center girder, strong enough to support the load on both tracks, were put in to one side of the abutments. If in the future a double track line is built, another light side girder can be placed to accommodate the second track. The cross-section of the abutments and the photograph show the design clearly.



Completed Bridge Showing Heavy Center Girder for Future Double Track.

Rear Face of Abutment Showing Buttresses.

In designing the abutments and floors it was decided to use steel and concrete because of the durability and cheapness of this method of construction and its adaptability to being shaped to the required forms. Small sections of steel, well distributed through the mass of concrete, were found to give better results than larger sections placed at wider intervals. Smooth rods were not considered because the leading engineers in this country and in France have shown that dependence cannot be placed on the adhesion of concrete to smooth rods. This was shown as far back as 1876 by Prof. David Kirkaldy, of London, from the results of 48 tests. In every case the smooth rods slipped in the concrete when no provision was made to prevent the slipping. A recent series of tests by Prof. C. W. Spofford, published in *Beton und Eisen** corroborates Kirkaldy's experiments. The vibration caused by the rapid passage of trains would soon destroy all adhesion between the concrete and the smooth rods in a structure of this kind.

Three kinds of steel rods, suitable for concrete-steel work and especially designed to prevent the slipping of the bar in the concrete, were considered. These were the Ransom, the Thatcher and the Johnson bars. The Johnson bars, made by the St. Louis Expanded Metal Fireproofing Co., were preferred and used. The size of the rods adopted for the abutments was ¾ in. square, and for the floor slabs, ½ in. sq.

The specifications for the concrete were considered carefully before adoption. American Portland cement was required of such fineness as to allow not less than 90 per cent. to pass through a No. 100 sieve, and the tensile strength of the neat cement after setting one day was required to be not less than 200 lbs. per sq. in., and for seven days not less than 500 lbs. Boiling tests were also specified. The cement was required to have attained its permanent set in not less than one hour nor more than six hours after mixing.

The aggregates used were sand and gravel obtained from a pit on the railroad, and the mixture used for the abutments was one of cement, to three of sand and five of crushed gravel. As the slabs for the steel-concrete floors were to be waterproof and to be as thin as possible, it was decided to use a mixture of three parts of very coarse sand to one of cement. Twenty-eight day tests of 4-in. cubes made with a 1-3-5 mixture developed an average compressive strength of 1,600 lbs. per sq. in. before failure.

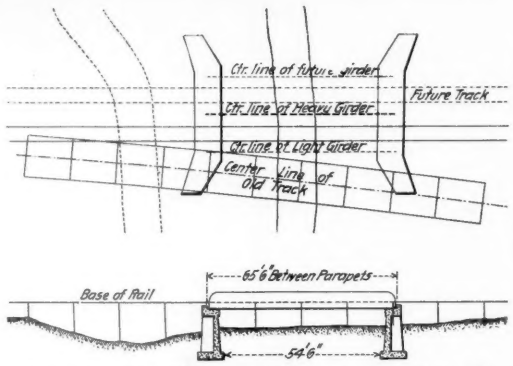
As it is impossible to work a dry or even medium dry concrete around the bars, the specifications required the mixtures to be made wet enough so as to necessitate no tamping. The concrete was dumped in place in layers and worked around the bars with spades, and thus tramped in place by the workmen. All faces that would be exposed after the forms were taken down were spade finished, that is, the spades were shoved down between the concrete and the forms and all large pieces were worked back, allowing the small particles to flow between the spade and the forms. This was found to be a very satisfactory way to put a neat finish, as the photographs show.

The abutments were so designed that the vertical pressure of the earth on the base prevents the structure from overturning. The horizontal pressure is taken care of by the vertical face, which acts as a slab-beam from buttress to buttress, the buttresses being, as it were, abutments for the slab. The buttresses tie the face wall to the base, the main ones being used in addition as pilasters to carry the girder. In building these abutments, the following method was adopted: The base was first laid with the vertical rods standing out of it and held in place by wooden trestles built outside of the base, upon which scantling were placed crosswise, and then a string of boards lengthwise to which the bars were held by nails, these supports being at about two-thirds the height of the bars. The frame for the form was then built, and the matched lumber forming the face of the abutment was nailed in place. The boards for the other faces were cut to fit their respective places, and were nailed as required. A horizontal section of the whole abutment was finished each working day.

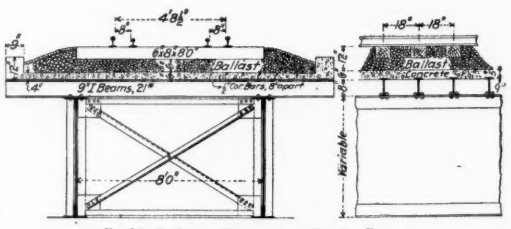
The drawings of the solid floor bridges show quite clearly their construction, and, therefore, need no description, but perhaps it would be well to describe the method of putting them in place. The horses upon which were placed the boards to support the concrete, were sawed from 3-in. plank and to a template, so that the ends would fit between two adjacent beams and rest on the bottom flanges. The tops of the horses were 2 in. below the top of the I-beam and were placed at intervals of about 3 ft. Upon these horses and running parallel with the floor-beams, the ⅞-in. boards were laid flat and faced on the upper surface. These ⅞-in. boards were about 8 in. wide and about 13 ft. long, two of them thus easily fitting in between adjacent floor-beams. Concrete, or more correctly speaking mortar, consisting of three parts of very coarse sand to one of cement made wet, was first laid on the boards till the top of the mortar was about ½ in. above the top of the I-beams. The rods were then laid, spaced as shown, their weight making them sink in the mortar, and bringing them against the top of the I-beams. Upon this lower layer and before same had time to take its set, the top layer was placed and finished off to the outline shown on the print. It was made a rule that if it was impossible to entirely finish a bridge floor that the day's work would show a completed cross section of the slab.

On bridges over streams, holes were placed in the slab in the center for through bridges and at the sides for deck trusses at intervals to allow the water to run out. Over streets, however, troughs were made higher at the center of the bridge, thus draining the water to the abutments.

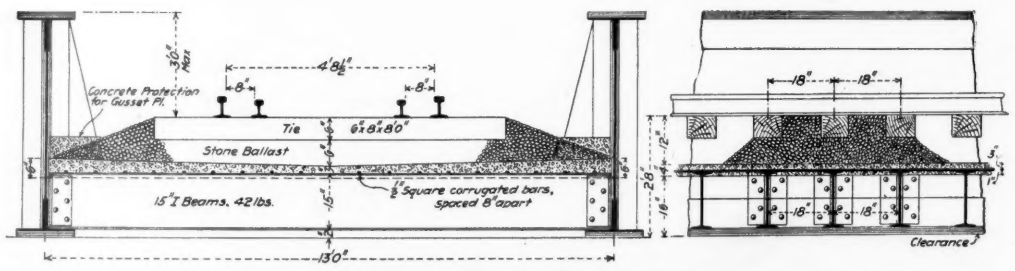
The artistic outlines of the abutments were designed by H. M. Cryder, Asst. Engineer in charge of the drafting room. The panel effect was produced by nailing 2½-in. half-rounds to the inside face of the forms. Each abutment contains 103.5 cu. yds. of concrete and 4,985 ft. of ¾-in. corrugated steel rods weighing 6,480 lbs. This is about half the amount of concrete which would be required for an ordinary abutment. The cost of the steel-concrete abutments is from two-thirds to one-half the cost of the usual concrete or stone abutment, the percentage depending on the size. The contractor for the masonry of the bridge at Carpenter was William P. Carmichael, of Williamsport, Ind.



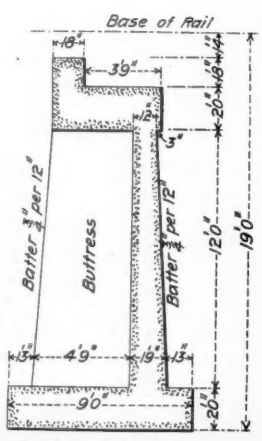
Plan and Elevation of Bridge at Carpenter, Ill.—Wabash Railroad.



Solid Bridge Floor for Deck Span.



Solid Bridge Floor for Through Span.



Section of Abutment.

In Holland freight earnings are very slightly less than passenger earnings, the numerous canals reaching almost every neighborhood. Gross earnings per mile in 1901 were $8,495, which is very nearly the average here. The mileage is small (1,750 miles), but so is the country—a trifle larger than Maryland, but with four times as many people.

*Republished in *Railroad Gazette*, Sept. 18, 1903.

New York, Ontario & Western Box Car.

The New York, Ontario & Western standard 80,000 lbs. capacity box car shown in the accompanying illustrations has some peculiar features of construction which make it a particularly strong and substantial piece of rolling stock. It has a wooden underframe and draft sills and the body framing is also of wood re-enforced on the end girths and posts with ½-in. iron plates. The side and intermediate sills are 5 in. x 8 in. timbers. The center sill is a combination of two 5 in. x 8 in. sills spaced 9 in. apart and one 8-in. x 8-in. sill placed between the two and tied together with ¾-in. bolts, spaced 20 in. center to center. The draft sills, which are 5-in. x 12-in. timbers, run back to the bolster and are fastened to the outside center sills with five 1-in. bolts and one key. The middle center sill is not connected to the draft timbers directly but serves to transmit through the car the shock of the coupler horn striking the end sill when the capacity of the draft gear is exhausted.

The side framing of the car is made up of 5-in. x 2½-in. posts and braces arranged in the form of a combination of the Howe and Pratt trusses. The posts are framed into the sill and plate but the diagonals are framed into malleable iron pockets or shoes. The end construction is designed to effectually prevent the breaking out of the end of the car due to a shifting load. In the Central Railroad of New Jersey box car described in the *Railroad Gazette*, 4-in., 5¼-lb. channels are fitted around the posts and girths, but in this car, 3½-in. x ½-in. iron plates are bolted on the inside face of the upper and lower end girths and on both edges of the two middle posts. The posts are framed into the end sills and plate with pockets of malleable iron. In the side framing two posts, 4 in. x 2½ in., are used over the bolster instead of the usual single post. These are tied to the corner posts with two ⅞-in. rods and give added strength to the end framing.

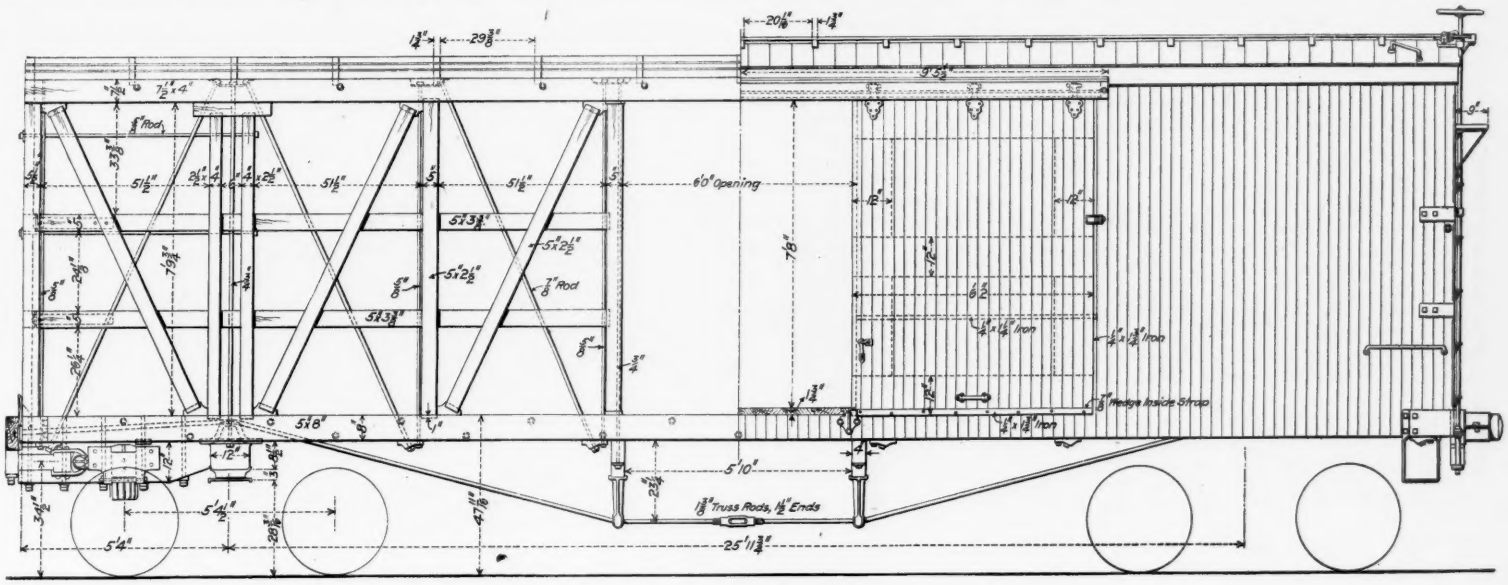
The general dimensions of the cars are, length 36 ft. inside, width 8 ft. 6 in. inside, height 8 ft. inside, cubic capacity 2,448 cu. ft. We are indebted to Mr. George W. West, Supt. of Motive Power, and Mr. J. F. Moore, Master Car Builder of the New York, Ontario & Western, for the drawings.

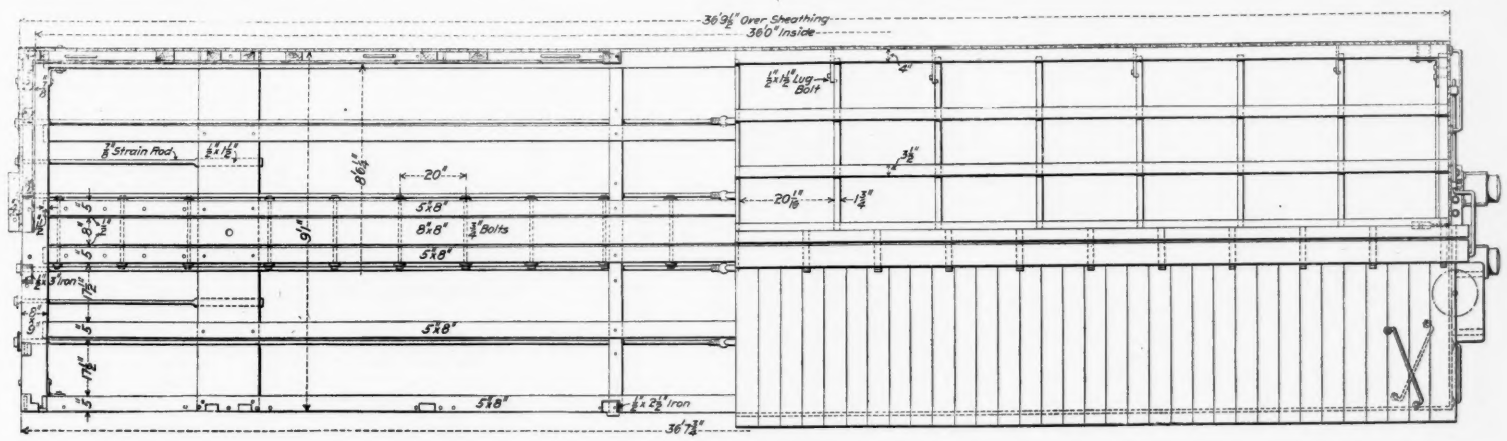
The Baltimore & Ohio Situation.

On the last day of last year the company entertained guests at luncheon on the great new import pier at Baltimore, and the retiring president, Mr. L. F. Loree, had an opportunity, in introducing the successive speakers, to give his views in a compact and delightful manner:

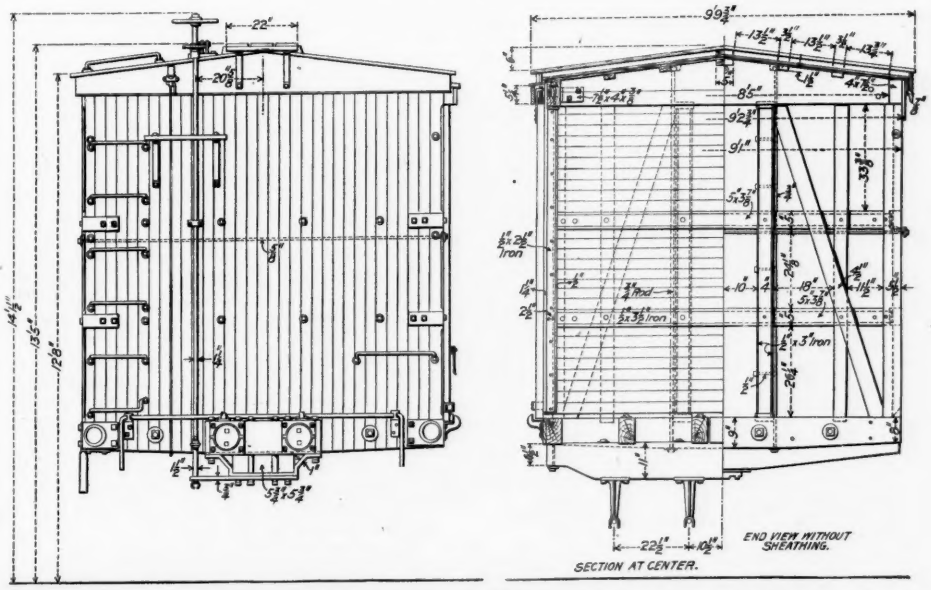
A corporation of the first magnitude, and of the character of a railroad, bases its hope of successful operation very largely upon organization, discipline, and continuity of employment. At all times forms of organization have swung between the extremes of great centralization and great decentralization. We have sought to steer a safe middle course, and believe that the organization introduced here, while conserving the strength of the operating division, which has been so marked a feature in the administration of the Pennsylvania Railroad, has retained the efficiency of the department, as exemplified in the workings of the Lake Shore and other lines. It must always be kept clearly in mind that discipline contemplates two distinguishable attitudes: The person disciplined may be a disciple, a learner, a scholar, or he may be one subjected to punishment. Both relations contemplate knowledge, capacity, fair dealing and resolute courage on the part of the officer chargeable with administering discipline. There is no more important function to discharge, nor one to which more care and thought should be given. There must be such continuity of service as will insure to each a reasonable hope of advancement, and to the entire body a continuous policy; a history personal in its character, and an esprit de corps founded on mutual respect and confidence. The advancement of the Vice-President to the Presidency of this company evidences clearly to all the fruition of this condition. You will, I know, give to him that full measure of loyal support that he and you have given to me. [Introducing Mr. Oscar G. Murray, the new President.]

The situation in which we now are has seemed to me to be typical of relations that ought always to be kept





Plan and Side Elevation of 80,000-lb. Box Car for the New York, Ontario & Western.



End Elevation and Cross Section of 80,000-lb. Box Car, N. Y., O. & W.

in mind, and upon occasion duly emphasized. We are in the City of Baltimore; we are on the banks of the Chesapeake Bay; we are at the most important terminal of the Baltimore & Ohio Railroad. The Chesapeake Bay is the gift of the Creator, to be cultivated, improved, and brought into the service of the community. The City of Baltimore is here because it is at the head of navigation in the bay, and the Baltimore & Ohio Railroad exists because when it became evident that a change was necessary in methods of inland transport, the people of Baltimore sought to provide themselves with a new mode of conveyance, by constructing a line that would put them into communication with the western territory, to which they had afforded a market. In 1827 the books for subscription to the stock of the Baltimore & Ohio Railroad were opened on March 20, and closed on March 31, when 22,000 persons had subscribed to $4,178,000 of the capital stock of the company. At that time the aggregate of the real and personal wealth of the city was but $25,000,000, and the populatian was, perhaps, 70,000. Now, the value of the property for taxation is $491,000,000 and the population exceeds 625,000. Our people have professed to be much astonished during the past four years, at the capital absorbed in railroad and industrial enterprises, but it is doubtful if any project has of recent years been launched that overshadows this beginning of the Baltimore & Ohio Railroad, either as to its relative magnitude, or the courage, persistence and dogged determination with which this community set out now

more than 76 years ago to preserve its importance. [Introducing Mayor McLane.]

When I came to Baltimore, 31 months ago, I put into service an improvement in the facilities of the company that had just been completed by my predecessor, Mr. John K. Cowen—the coal tip at Curtis Bay, the largest structure of its kind on the Atlantic Coast. In a few days, my successor, Mr. Oscar G. Murray, will begin to handle business over another notable addition to the facilities of the road in this city—the largest pier for export and import on the Atlantic seaboard; a structure 137 ft. in width, 800 ft. in length, of two stories, with four acres of floor space, fitted with every modern convenience for the handling of passengers and for the transfer of freight. These two structures, placed here where they can be seen of all men, are fairly typical of the strength of the Baltimore & Ohio Railroad and of its set purpose to provide for this community the most perfect instrument of transportation possible in the present state of the art. This company owns in this city more than ten million dollars worth of property; it is expending here in permanent improvements more than half a million dollars annually; it distributes here through the wages of its officers and other employees nearly six million dollars each year, and it buys here great quantities of material consumed in its operations. The officers responsible for the conduct of its operations keenly realize their obligations to the city and the State, and have the fixed purpose of discharging them to the full. [Introducing Mr. W. Irvine Cross, of counsel for the company.]

In June, 1867, the Baltimore & Ohio Railroad Company entered into an agreement with the North German Lloyd Steamship Company for the establishment of a line of first class steamers between Baltimore and Bremen, subscribing thereto one-half the necessary capital. The first steamer arrived from Bremen March 22, 1868. Its gross measurement was 2,500 tons; the sailings were monthly, and for the year there were handled 4,000 passengers. Though the partnership has long since ceased, the friendly relations of the two companies have steadily grown more intimate, until now, we have had, during the past year, steamers in the service of 11,000 tons gross measurement, with weekly sailings, and a passenger list for the year of more than 60,000. On the 26th of March, 1868, the incorporation of this service was celebrated by a complimentary banquet given by the merchants of Baltimore to the officers of the pioneer steamship of the Baltimore and Bremen line, so that we are on this occasion but following a notable precedent. Many of you recall the delightful luncheon given us in June, of last year, by the North German Lloyd Company, and my promise then given that I would provide the company with facilities in keeping with the growth of the business. The structure in which we now are is the fulfilment of that promise, and to it we welcome the North German Lloyd Steamship Company, through its chief representative, Mr. George A. von Lingen.

The length of the coast line from Maine to the Rio Grande is 3,895 statute miles. In all that long distance there are, for the purposes of important international commerce, but nine harbors: Portland, Boston, New York, Philadelphia, Baltimore, Norfolk, Savannah, New Orleans and Galveston. It is of prime importance to the whole nation that the development of these harbors should be kept abreast of the advances in marine architecture, and that the value of each should be preserved in its fullest efficiency. The average channel depth at mean high water of 123 principal ports of the world is 31.63 ft. In the important commerce carried on with European ports, the depth of Baltimore, 31.50 ft., is no longer sufficient to permit of approach by the latest types of steamers, and the port, which already suffers from the great passenger business that has been built up at New York and Boston, suffers still further from the limitations of its channel depth. I have been much interested in the intelligent effort being put forth by the Chamber of Commerce toward the improvement of the port. If its efforts are crowned with success, Baltimore will be placed on a parity with its competitors. There will yet remain, however, an improvement that is essential to the maintenance of your coastwise trade. Your communication with New England would be shortened by 194 miles through the construction of the Chesapeake & Delaware Canal; the dangerous coast between Norfolk and the Delaware Capes would be avoided; and your city, for coastwise trade, would be placed practically upon the ocean front, instead of as now, 150 miles inland. The bay has, moreover, other possibilities of usefulness. The State should bring under control, for purposes of cultivation, the entire submerged area, and the time should come when the packing and transport of sea food will be as characteristic of Baltimore as similar treatment of stock yard products is of Chicago and Kansas City. [Introducing Major Richard M. Hoxie, U. S. Engineer Corps.]

There have been times in the history of this country when people have asked themselves, with great seriousness, where is the United States? It may, of course, be found in the seat of Government in the District of Columbia. It is at times to be seen in its local administrations of the custom house or post office. It is always, we know, in the hearts of its citizens. But now and again we are surprised to find ourselves in immediate touch with it through the officers of its great departments. In the designing of this structure, in adapting it to the important function of caring for immigrants entering the country, perhaps no one has taken a more personal interest, or made suggestions of greater value, than the Honorable Commissioner of Immigration. Here the immigrant may disembark from the vessel, conform to the necessary requirements of the law, and without getting from under cover, or being exposed in any way to temptations or impositions, enter the passenger cars of the railroad, and proceed on his journey. No single feature has so commended the Port of Baltimore to the patronage of this class of passengers as this sense of personal security. [Introducing Mr. Frank P. Sargent, Commissioner of Immigration.]

Interurban Trolley Roads in Indiana.

Previous articles* which have appeared in the *Railroad Gazette* during the last two years, describing some of the important interurban electric railroad centers in this country, laid particular stress on the competition of the electric roads with the steam roads in the same territory, both in freight and passenger traffic. The City of Indianapolis, Indiana, as a trolley road center of the first importance, affords a good opportunity for a general analysis of the electric interurban roads as they affect the business of the competing steam roads and also the prosperity of the terminal city and the surrounding country. At the present time there are 15 lines of steam roads entering the city which converge from all parts of the State and paralleling eight of these lines, are electric interurban roads in full operation with three other lines now building which also parallel existing steam roads, all of which will be in operation within a year. When the lines now building are completed there will be only one steam road out of the city which will not be in direct competition with a trolley road for a greater or less distance.

Geographically and commercially, Indianapolis is the center of the State. It is located in the heart of a rich agricultural region and is surrounded by numerous thriving towns and cities which on account of their more or less inadequate transportation facilities to and from other important business centers, depend on it as a distributing point. To this the city owes much of its business prosperity and with more and better facilities for travel offered by the interurban roads it is rapidly growing in size and importance. The population according to the census of 1900 was 169,164, but at its normal rate of growth it should be well over 200,000 in 1904.

It is hardly possible to study the growth of the trolley roads leading directly into Indianapolis without taking into account the network of lines in the gas belt towns, some 35 miles northeast, where the first interurban roads in the State were built and which are connected with Indianapolis with two of the best equipped lines leading out of the city. The limited trains running from Indianapolis to Anderson without stop and making direct connections to all points in the gas belt give a service which affects the steam roads heavily in the comparatively long haul business.

The Indiana Union Traction Co., lessee of the Union Traction Co. and the Indianapolis Northern Traction Co., operates 210 miles of interurban road and nearly 55 miles of city lines in Anderson, Marion, Muncie and Elwood. In 1897 the old Anderson Electric Street Railway built an extension north to Alexandria, and this line marked the beginning of the interurban development in the State. An extension of the Marion City Railway, nine miles south to Fairmount, was opened a few months later. In July, 1898, the Union Traction Co. took over the lines in both cities and began the construction of lines to connect all of the important cities nearby. The small map shows the lines built and building as well as those projected at the time of the consolidation of the city lines.

The Indiana Union Traction Co. was incorporated in June, 1903, with an authorized capital of $5,000,000, to lease and operate the existing and projected lines of the Union Traction Co. of Indiana which a few months previous had absorbed the Indianapolis Northern. Of the $5,000,000 first mortgage bonds authorized, only $1,000,000 have been issued, the remainder being reserved for extensions and improvements, but only when the net earnings exceed 1½ times the interest charges. A sinking fund of 1¼ per cent. per annum of the outstanding bond issue becomes operative, July, 1904, to be applied to the retirement of the bonds at 105. The holding company guarantees the dividends on the $7,500,000 issue of Union Traction outstanding common stock from July, 1903, to the termination of the lease, at an increasing rate, 1½ per cent. the first year, 2 per cent. the second year, and so on to 6 per cent. for the eighth year and thereafter. The capitalization per mile for the whole system, including the city lines, and based on an outstanding stock issue of $7,500,000 common and $1,000,000 5 per cent. preferred, is $32,000. The outstanding bonds of the constituent companies which are guaranteed aggregate $8,493,000, giving practically the same bonded indebtedness per mile as the capitalization. The statement of earnings and expenses for the years 1900, 1901 and 1902 is as follows:

	1902.	1901.	1900.
Gross earnings	$962,266	$752,520	$447,616
Operating expenses	516,503	422,675	247,045
Net earnings	$445,763	$329,845	$200,571
Interest, sink'g fund, taxes, etc.	297,657	260,065	177,946
Surplus	$148,106*	$69,780	$22,625

*Out of this, $31,434 was paid as 5 per cent. dividend on preferred stock.

*See the *Railroad Gazette*, May 23, 1902, p. 378; June 6, 1902, p. 405; Feb. 6, 1903, p. 93; Aug. 21, 1903, p. 600; Nov. 27, 1903, p. 843.

In 1900 the mileage worked was only 44 miles of interurban and 56 miles of city street railroad. In 1902 the mileage worked was 97 miles of interurban and 56 miles of city road. The line from Anderson to Indianapolis was not opened until Jan. 1, 1901, and the reconstruction of some of the lines and the erection of the new power house at Anderson during 1900 and 1901, interfered seriously with the traffic and the economical operation of the road during those years. Gross earnings for the 11 months ending Nov. 30, 1903, were $1,012,430 as against $869,295 for the same period in 1902, but this included the earnings of the Indianapolis-Kokomo line, 56 miles, which has been in operation since last September. The gross earnings per mile of track for the month of November, 1903, were $3,594.

The two divisions of the Indiana Union Traction Co. which run into Indianapolis are the lines to Muncie and to Logansport. The Muncie line is 56.6 miles long and parallels the Cleveland division of the C., C., C. & St. L. for nearly the entire distance. At Anderson connection is made with the lines to Newcastle, Alexandria, Elwood and Marion. The Logansport line runs almost straight north, parallel to the Monon to Carmel and then northeast to Noblesville, 23.6 miles from Indianapolis. From Noblesville to Kokomo the line runs alongside of the Lake Erie & Western, and one branch from Kokomo continues to follow the line of the L. E. & W. into Peru, while the other branch parallels the Pennsylvania Line into Logansport. At Tipton a connection is made to Elwood, from which other branches of the Union Traction Co.'s lines run to Alexandria and Anderson.

There are a number of independent connecting lines in the northern part of the State, some in actual operation, some building and others laid out on paper. The most important of these are the Wabash & Logansport and the Ft. Wayne & Southwestern, which form a continuous line from Logansport to Ft. Wayne, parallel to the Wabash main line from St. Louis. The Muncie, Harfford & Ft. Wayne is in operation from Muncie north to Bluffton, 41.8 miles, and will be extended to Ft. Wayne, 25 miles further, probably during the coming year. As it connects at Muncie with the Indiana Union Traction Co., the opening of the line through to Ft. Wayne will give a direct route from Indianapolis to that point. Cleveland capitalists own and operate this road, which has been very successful since it was opened in February, 1903.

Of the other lines running out of Indianapolis the Indianapolis & Eastern has one of the longest through lines, 50 miles east to Dublin, where it connects with the Richmond Street & Interurban Ry., running 18 miles further to Richmond. This road was incorporated in 1902 as a consolidation of the Indianapolis & Eastern Traction and the Indianapolis & Greenfield Rapid Transit. Of the $1,300,000 authorized bond issue, $1,000,000 is outstanding and also all of the issue of $1,200,000 of stock. The Indianapolis & Greenfield was the second interurban road to enter Indianapolis, having been opened in June, 1900. When the consolidation was effected the line was extended through Knightstown to Dublin and a branch 10 miles long built from Dunreith north to Newcastle, where connection is made with the Indiana Union Traction Co. The line runs on one side of the old National Road for nearly its entire length and is not fenced off with private right-of-way. Over this line a passenger can go to Richmond, Ind., and from there to Dayton, Springfield and Columbus, Ohio, from which points electric lines now extend to Toledo, Cleveland, Cincinnati and Wheeling, W. Va. Indianapolis men own most of the bonds and stock of this road.

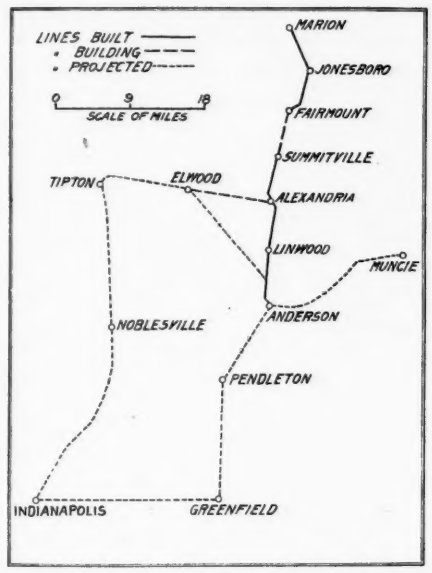
The Indianapolis & Cincinnati Traction Co. is building a line southeast from Indianapolis which will ultimately reach Cincinnati, 125 miles, by way of Rushville, Connersville and Hamilton. It is expected to be in operation to Connersville during this year. This road as planned will be the best example of high speed interurban road in the Middle West. With the exception of about one-half mile the line will be on private right-of-way for the entire distance except at the two terminal cities. It will be double tracked and the third rail system installed. Every provision is being made to maintain a scheduled speed of 50 miles an hour, including stops, with the limited trains. The franchises obtained in all the cities and towns allow the operation of a limited train service making only three stops between Indianapolis and Cincinnati, one each at Rushville, Connersville and Hamilton. The C., H. & D. will feel the effects of the competition of this line, as it is paralleled all the way, the interurban road running within 500 ft. to 600 ft. of the steam road and passing through all the same towns and cities. The road is capitalized at $2,000,000 and has an authorized bond issue of $4,000,000, only half of which is outstanding, the other half being reserved for extensions and improvements. On Oct. 13, 1903, the Indianapolis & Cincinnati Traction Co. purchased the entire capital stock of the Indianapolis, Shelbyville & Southeastern amounting to $600,000, with the purpose of ultimately consolidating the two companies, although for the present it is being operated independently. The Shelbyville line parallels the Cincinnati Division of the Big Four to Shelbyville, 27 miles southeast of Indianapolis. With the exception of 3½ miles just outside of Indianapolis the road has a private right-of-way. An extension to Greensburg, 18 miles, will be built this year. Mr. Chas. L. Henry, who is President of the Indianapolis & Cincinnati, was the pioneer builder of interurban roads in Indiana, having conceived and built most of the lines in the gas belt region, while connected with the old Union Traction Company, of which he was Secretary and one of the incor-

porators. The first interurban road entering Indianapolis was the Indianapolis, Greenwood & Franklin, now the Indianapolis, Columbus & Southern Traction Co. It was opened in January, 1900, between Indianapolis and Greenwood, 12 miles, and since that time has been extended south through Franklin to Columbus, 40 miles in all. The extension to Columbus, from Franklin, was opened in October of last year. The road has a private right-of-way for most of the distance and is parallel to the Louisville Division of the Pennsylvania Lines. Capital stock to the amount of $285,000 has been issued and $300,000 of an authorized issue of $1,000,000 in bonds is also outstanding, Philadelphia interests having underwritten them. The remaining $700,000 in bonds is reserved for the extension to Columbus and other extensions at not over $15,000 per mile.

Running southwest from the city is the Indianapolis & Martinsville, opened for traffic in May, 1903. This road is 30 miles long and is substantially built for heavy traffic. Martinsville, at the end of the line, is a famous watering place and has a number of large hotels which are open all the year. The local traffic in both directions is unusually heavy and the electric road has done a large business from the start. The bond issue per mile is $25,000, and the total capital stock is $750,000. Local capitalists own and control the line.

The beginning of one of the largest traction enterprises in the State is the short line now in operation between Indianapolis and Plainfield, 14 miles west. A company incorporated in 1901 under the name of the Indianapolis Coal Traction Co., with a capital stock of $2,500,000, and an authorized bond issue of $5,000,000, took over in 1903 the line of the Indianapolis & Plainfield and proposes to build a line west to Brazil and Terre Haute, with branches from Plainfield to Danville, Greencastle to Rockville and Terre Haute to Sullivan, a total of 165 miles. Part of the line is now under construction and right-of-way has been secured for the remainder. It is proposed to build a double track trolley road from the coal fields into Indianapolis and to haul coal in standard coal cars with electric locomotives into the city. The heads of some of the largest industrial enterprises in Indianapolis are interested in the road since

All of these roads have their own tracks up to the city line or to the nearest connection inside of the corporate limits, with the lines of the Indianapolis Traction & Terminal Co., which leases the Indianapolis Street Railway for a period of 31 years from Dec. 29, 1902. Under the terms of an act of the Legislature passed in March, 1899, which applies to all cities of 100,000 population or more, the Traction & Terminal Co. must allow the cars of all interurban lines which obtain a franchise to enter the city from the city council, to run over such of its tracks as the Board of Public Works may direct. As compensation for such use of its tracks the Traction & Terminal Co., by an agreement entered into with the various interurban companies, receives 3 cents for each

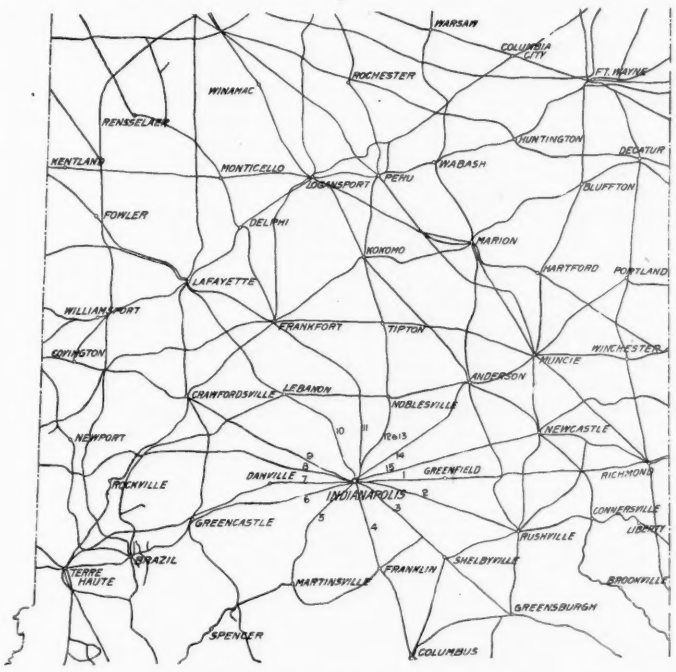


Interurban Trolley Lines in Indiana, July, 1898.

times no live animals except hunting dogs can be carried on any cars. Within 180 days after signing the contract the interurban companies must provide a freight depot in the central part of the city at some approved point, where all freight and baggage must be loaded and unloaded. Pending the erection of such a depot the cars may be run on certain "dead" tracks and there unloaded. The right is reserved by the Board of Public Works to restrict or stop entirely the carrying of freight through the city if necessary for the public comfort and safety. All roads must file a bond of $10,000 to cover the observance of the terms of the contract, and from this bond a penalty of $50 a day may be collected for the violation of any of the articles of agreement. The companies are further required to pay for the first seven years which the contract runs, the sum of 5 cents per round trip for every car running into the city, for the next 10 years the sum of 15 cents, and for the balance of the time, 25 cents per round trip. The contracts for all the companies expire on April 7, 1933.

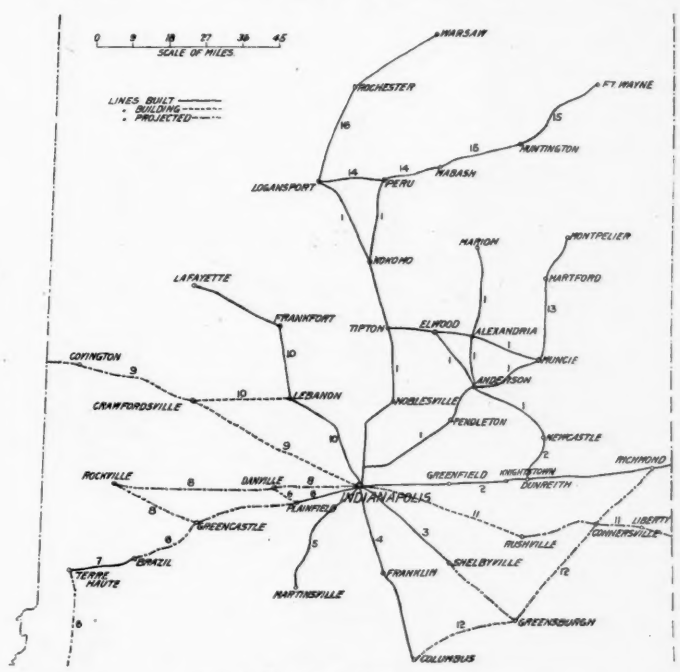
The Traction & Terminal Co., in the interests of all of the interurban roads, has made extensive plans for taking care of all the freight and passenger business of those roads in one large terminal station in the heart of the city. The plans contemplate the construction of a belt line around the congested streets over which all the interurban cars will run into the terminal station now building in the block bounded by Illinois street, Capitol avenue, Ohio street and Market street, within one block of the heart of the retail business district. Complete plans for this terminal have not yet been prepared, but the construction of the passenger station and office building is now being pushed. It is probable that sufficient storage tracks will be provided for the loading and unloading of at least a portion of the freight and probably all the baggage and ample accommodations for passenger cars. When the station is completed the company will receive an additional compensation from the interurban roads of 1 cent per passenger for the terminal facilities provided, making the amount 4 cents instead of 3 cents as at present.

With this general idea of the situation in mind it remains to take up the policy of the interurban roads in



Steam Roads in Central Indiana.

1. *Penna. Lines, Indianapolis Division.*
2. *Cincinnati, Hamilton & Dayton.*
3. *Big Four, Cincinnati Division.*
4. *Penna. Lines, Louisville Division.*
5. *Penna. Lines, Vincennes Division.*
6. *Vandalia Line.*
7. *Big Four, St. Louis Division.*
8. *Cincinnati, Indianapolis & Western.*
9. *Peoria & Eastern, Western Division.*
10. *Big Four, Chicago Division.*
11. *Monon.*
12. *Lake Erie & Western.*
13. *Penna. Lines, Chicago Division.*
14. *Big Four, Cleveland Division.*
15. *Peoria & Eastern, Eastern Division.*



Electric Roads in Central Indiana.

1. *Indiana Union Traction Co.*
2. *Indianapolis & Eastern.*
3. *Indianapolis, Shelbyville & Southeastern.*
4. *Indianapolis, Columbus & Southern.*
5. *Indianapolis & Martinsville.*
6. *Indianapolis Coal Traction.*
7. *Terre Haute & Brazil.*
8. *Indianapolis, Danville & Rockville.*
9. *Consolidated Traction.*
10. *Indianapolis & Northwestern.*
11. *Indianapolis & Cincinnati.*

it promises to provide a cheap rate on coal brought into the city. The steam road rate is now about 50 cents a ton for a haul of from 80 to 90 miles. The proposed line will run close to both the Vandalia and the St. Louis Division of the Big Four all the way to Terre Haute. Two other lines running west from the city which are not yet in operation are the proposed Indianapolis, Danville & Rockville and the Consolidated Traction Co.'s line to Crawfordsville, which is building. The latter line is to be extended to Urbana, Ill., and will parallel the Peoria & Eastern for nearly 100 miles.

The latest line to be put in operation from Indianapolis is the Indianapolis & Northwestern, running to Lebanon, Frankfort and Lafayette, a total of 64 miles. A branch line from Lebanon to Crawfordsville, 23 miles, is almost completed. This road was opened in October last and is a well built, modern, high-speed line. It is capitalized at $2,000,000 with a $3,000,000 bond issue, of which $1,920,000 is outstanding. Of the remainder, $650,000 is reserved for the Crawfordsville extension and $430,000 for other improvements and extensions to be issued in amounts not to exceed 50 per cent. of the cost of such improvements. Townsend & Reed, contractors for a number of the trolley roads in Indiana, built and control this line, but the entire issue of bonds was taken up by a Boston syndicate headed by E. H. Rollins & Sons.

passenger carried on the interurban cars when the cars are running on the city tracks. The same act of the Legislature compels the Traction & Terminal Co. to accept 5 cent cash fares and to sell six tickets for 25 cents, or 25 tickets for $1 with the privilege of transfer. The interurban companies are permitted, however, to charge a straight 5 cent fare without transfer, and the amount of local city business which they do is very small.

The contract entered into with the city by the interurban lines is the same for all companies. Cars must stop at all street crossings to take on or let off passengers, but no baggage, other than hand baggage, or package freight may be unloaded or taken on at such crossings. The cars must be run so as not to interfere with the regular service of the city lines, and in their operation all rules and regulations of the Terminal & Traction Co., as to speed, stops and grade crossings must be observed. It is expressly provided that between the hours of 6 a.m. and 11 p.m. at least one car every two hours must be run. The companies are permitted to carry in compartments in passenger cars or in express cars approved by the Board of Public Works, baggage, express matter and package freight suitably boxed or crated, provided it is loaded and unloaded at the depot or station of the company. Between the hours of 12.30 a.m. and 4.30 a.m., fowls secured in crates may be carried, but at all other

developing traffic, the attitude of the people and the law making bodies in regard to public franchises, and the attitude of the railroads, and to attempt to forecast in some degree the future of the lines already built and to be built.

(To be Continued.)

The Health of Locomotive Enginemen.

At a meeting of the German Locomotive Enginemen's Union in Dresden, Nov. 3, Dr. Gilbert, Consulting Physician of the Saxon State Railroads, made an address on "What the engineman should do to keep his health." Their occupation, he said, requires as do few others, a high condition of health to sustain the physical exertion, the constant exercise of the organs of sensation, the sense of responsibility and necessity of rapid decisions incident to it. Yet it makes it impossible for them to enjoy nourishment and rest at regular intervals. Sometimes their rest comes by day; sometimes by night. Few under such circumstances can enjoy unbroken refreshing sleep. This imposes on their superiors the duty of so arranging the service that the necessary irregularities may cause the least possible injury; and they have done much; have limited the hours of service in a day;

prescribed entire days of rest in each month, and a vacation every year; and much has been done for health, comfort and safety. But the service is and must remain a trying one, and the engineman's health will always to a great extent depend on his own conduct, on duty and off. He must not have his mind occupied by distracting cares concerning his family or private affairs. He must avoid everything which may weaken his powers and undermine his health; must live only for his work and his family. Not that all recreations are prohibited, but a limit must be drawn to them—limits prescribed by the need of sleep and by the income of the man. Such a condition is not unnecessary in these days of social organizations—card clubs, bowling clubs, singing and dancing societies. Living within the means, happy marriage, a happy family life, are the ground on which flourish efficiency and joy in one's calling, and are the best guarantee against nervous disturbance and exhaustion. A sick wife or child at home often reduces the man's capacity for work, and Dr. Gilbert recommended a co-operative organization which in such cases should provide a nurse or housewife in the afflicted family, thus reducing the care of the man absent on duty. For this he believed the grown daughters of the engineman's household, often really suffering for want of something to do, might well be utilized. He thought also that existing organizations for mutual pecuniary aid might well be so extended as to include not the men only but their families also.

Dr. Gilbert then discussed drinking habits; he said the ruinous effects of alcohol are now engaging the attention of all classes and conditions in Germany, and referred to the Railroad Abstinence Society recently established. He declared himself to share the opinion of those who believe that even a moderate use of alcoholic drinks reduces mental elasticity and freshness, while a habitual free use of them besides its bad effect on the nervous system, injures such vital organs as the stomach, the heart, the liver and the kidneys. He not only would discourage the use of such drinks while on duty, but any regular, daily consumption of them at all times, excepting a light beer. With the existing habits, which have long been established among the German people, he knew that such temperance could be established with difficulty; and only for those with some affection of heart, kidneys or liver, and especially of the nervous system, would he say that total abstinence is a necessity. The authorities cannot require this, even of locomotive enginemen, but they can welcome those who voluntarily abstain and should take measures to enable the enginemen to have warm meals and refreshing non-alcoholic drinks while on duty.

The first requisite of a healthful life when off duty is a suitable and comfortable dwelling. It should be dry and sunny, not too far from the place where the man goes on duty; except for those in large cities, who may well choose a house in the suburbs. Special attention should be paid to securing a quiet situation, so that it may be possible to sleep by day.

The only statistics kept for a considerable time showing the relative healthfulness of the different branches of railroad service are those of the Bavarian railroads. These show: 1. That of all employees, trainmen are most frequently ill, and on the average are soonest entitled to pensions for disability. 2. The frequency of illness is greatest in the first and in the last years of service, showing that the recruits and those worn out in the service have least resistance. 3. The frequency of illness in any one employment rises and falls with the amount of service required. 4. The frequency of illness is materially affected by weather conditions, and chiefly by the temperature, rain and moisture having comparatively little effect. An average monthly temperature of about 59 deg. Fahr. is most favorable to health; hotter or colder weather are both unfavorable. 5. Rheumatism, nervous diseases, affections of the respiratory and especially of the digestive organs—are more frequent in trainmen than in people of the same age in other occupations, and must be attributed to the demands of the service, and the irregularities in taking meals and sleep. These results of the Bavarian statistics Dr. Gilbert confirmed by his 10 years observations on the Saxon railroads.

This shows that the men themselves should follow the advice of the railroad physicians and make judicious use of the provisions made by the railroads for their health and comfort. They should make such use of their time off duty, of their days of rest and of their yearly vacations as to really rest and restore their health. They should nourish themselves healthfully; not make a midday meal of cold victuals brought from home, with coffee or beer; but, when they cannot eat at home or have a hot meal prepared for them on the road, take the home dinner with them and heat it at the places provided by the railroads. This, if not so good as a home dinner, is much better than a cold one, and it avoids making the chief meal at the end of the day, after service, near the time of sleeping.

The enginemen also should always make use of the provisions offered them for drying their clothes at the ends of their runs—whether wet by rain or by sweat—and of the baths, lavatories and dormitories, and watch that they are kept in good condition. Finally, they should not remain in the service when their powers begin to fail. Their position is too responsible to be held by any not in full possession of all his faculties.

The Origin of British Express Trains.

BY W. B. PALEY.

It is difficult now in England to dissociate the idea of express trains from that of railroad traveling in general, for except on purely suburban or other local journeys one always travels by the express as a matter of course, the abolition of restrictions as to class having made the term a distinction without any difference save as to speed. It was not always so, for down to 30 years ago if you did not go by the express it often meant many hours' extra traveling on journeys of very moderate length. If you did, it implied going first class instead of second, or second at a considerably increased fare, whilst except in a few special cases latterly, going third class was impossible.

The "Centaur," with Daniel Gooch at the Throttle.

The London & Brighton Company seems to have been the first to use the term "express" in railroad working, though as meaning a special messenger it is much older than their time. When that line opened throughout in September, 1841, a so-called "express" was one of its novelties. As it took 1¾ hours over the 50⅝ miles, up in the morning and down in the afternoon, it seems hardly to have deserved the title. It was soon discontinued, and not until August 26, 1844, was the alarming rate of 1½ hours reached between London and Brighton. The establishment of real express trains, however, was undoubtedly brought about by the rivalry of the broad and narrow gages, and to the Great Western belongs the honor of having started that competition in speed which has been going on all over the world ever since, and of which the end is not yet.

The first express train, therefore, was on the 7-ft. gage. It left Paddington on March 10, 1845, at 9:30 a. m., and reaches Exeter, 194 miles, at 2:30 p. m. A corresponding up train left Exeter at 11:45 a. m. and got to London at 4:45 p. m. Both made the same stops, five in number, the longest run being between London and Didcot, 53¼ miles. Deducting 30 minutes for the five stops, the Swindon one being of 10 minutes, we have a speed of 43.11 miles per hour on paper, or about 50 in practice. Only first and second class passengers were taken, at fares of 50s. and 34s. respectively. A van and three small coaches, the whole weighing with passengers and luggage 40 tons at the outside, was about the usual load, taken by a 7-ft. single-wheel engine, of the class shown in the accompanying illustration. These engines were not built for this special service, but had been introduced early in 1840 by Mr. Daniel Gooch as the standard passenger engine for the Great Western Railway. They had cylinders at first 15 x 15, afterwards 16 x 20, and 131 tubes, giving 557 sq. ft. of heating surface. The firebox had 90.6 sq. ft. more and the engines weighed, full, 54,205 lbs. The photograph of the engine Centaur is of particular interest, as the tall man on the foot-plate is the redoubtable "Dan'l" himself, who died a few years ago, a Baronet, a Member of Parliament and Chairman of the Great Western. The little iron shelter on the end of the tender is for a "traveling porter," who sat in it facing the train and was supposed to inform the enginemen if anything went wrong with it. The traveling porters were instituted in 1847, in consequence of a fire in a train, but their shelters long survived them.

At Easton they were not long in following the bold policy of Paddington, and on May 1, 1845, practically an hour was taken off the best time to Birmingham. A new train started at 4 p. m., and ran down in just three hours, calling only at Tring, Wolverton, Coventry, with first-class passengers only. The Great Western had retained their old fares for the expresses, reducing them for the other trains, but the London & Birmingham (now London & North-Western) lowered their charge even by the express 3s. They also issued a very sensible notice that "the accommodation by the express trains being limited, passengers who arrive first will have the preference." A gentle application of this rule nowadays might have a beneficial effect, by the way, upon railroad punctuality. Taking the three stops at five minutes each, and the distance being 112¼ miles, the running speed works out at 40.82 miles per hour. Four little band-boxes of coaches made up a load of about 20 tons, the Birmingham company's newest and largest engines being of the Bury type illustrated in the *Railroad Gazette* of June 4, 1897. They had 5 ft. 9 in. single drivers, cylinders 14 x 18, 585 sq. ft. of heating surface and stood upon a base, being four-wheelers, of only 7 ft. 6 in. In steam they weighed 27,740 lbs., and the speed was probably quite as much as they could safely manage. This train was taken on from Birmingham, Curzon Street Station, by the Grand Junction Company (now part of the L. & N. W.) to Liverpool and Manchester, at 7:10 p. m. Prior to this it had not been possible to get through from London to Liverpool if you started later than 1 p. m., and even then it was 11 o'clock at night before the weary journey of 210 miles (by the route then taken) came to an end. It was now practicable to arrive at 10:10 p. m., a gain of nearly four hours. The new train stopped at Stafford, Crewe and Warrington, but the speed, with 15 minutes deducted for these stops, only comes to 35.45 miles per hour. A momentary stop was also made at Edge Hill, just outside Liverpool, to detach the engine before going down the incline, then worked by a rope, into Lime Street Station. Similar rope-working at Easton had been lately given up. The coaches from London ran through to Liverpool, where a number of people waited at the station the first night the express ran, to see if so bold an experiment could really be carried out. The train was before time everywhere. Communication with Manchester was equally improved, part of the train being, no doubt, detached at Crewe. A corresponding up express left Liverpool at 4 p. m., but was slightly slower, being due at Easton at 10:30 p. m. The Grand Junction Company reduced their fares between Birmingham & Liverpool by these trains from 26s. to 23s., and advised passengers to secure their seats in advance, those going farthest having the preference when the train came in.

Although they were in no way equaled, much less beaten by these speeds on the 4 ft. 8½ in. gage, the Great Western replied on May 12 by taking half an hour off the running time of their Exeter express trains. To do this, however, the Swindon stop was given up, a proceeding which speedily led the refreshment contractor to seek an injunction compelling the company to make all trains stop there. This they did, mostly for ten minutes, until a very few years ago, when the contractors were bought out for the huge sum of £100,000. This acceleration to 4½ hours brought the speed of the famous Exeter expresses up to 46.56 miles an hour.

As may be supposed, the energetic "Railway King,"

Mr. George Hudson, readily fell in with these improvements in traveling. The ablest and most powerful opponent the broad-gage ever had, he could not ignore any advance made by it, and as he practically controlled all the lines between Rugby and Newcastle-on-Tyne, the 8:45 a. m. from the latter town was expedited to reach Easton via York, Leeds, Derby and Rugby, at 7:45 p. m., instead of 10:30, a gain of no less than 2¾ hours.

The London & South-Western Company also made, May 1, 1845, the commencement of the express-train era on their line. A fast train, first class only, was put on from each end at 12:30 noon. These made the run of 76¾ miles between the old London terminus in Nine Elms Lane and Southampton Docks Station in precisely two hours. From this, however, eight minutes have to be deducted for stops at Basingstoke and Bishopstoke (now called Eastleigh), making the speed practically 41 miles an hour. Two famous engines, the Snake and the Serpent, usually worked these trains; they had 6½ ft. single drivers, outside cylinders 14¼ x 21, and 898½ sq. ft. of heating surface in all. The late Mr. John Viret Gooch, a brother of Daniel Gooch, of the Great Western, designed these engines. From Bishopstoke, going up, there is a 17-mile grade of 21 ft. per mile. The stop there was made for a connection to and from Gosport, for the Isle of Wight steamers; in fact, the timing of the trains was mainly arranged to suit Court officials who had business at Osborne. Southampton commercial men grumbled tremendously at being unable to go to London and back the same day by express.

Even the Eastern Counties (now Great Eastern), then a very incomplete and disjointed system, became possessed with the mania for high speed, and on May 5 started a first and second class train each way between London and Bishop's Stortford, further than which the Cambridge line was not then open. Both made the run of 32 miles, from the old terminus at Bishopsgate round by Stratford, in 45 minutes, without a stop. This equals 42.66 miles an hour, but the line is an extremely easy one.

Some of the trains above mentioned were afterwards accelerated, and later on made slower again, or even discontinued, but railroad traveling had been raised by them to a distinctly higher level than it had occupied before. Better accommodation soon came into use, as heavier and stronger vehicles became necessary to stand the increased strain. In short, the spring of 1845 marks a most important, though now little known, epoch in British railroad history.

Railroad Presidents on the 1904 Outlook.

*E. P. Ripley, Atchison, Topeka & Santa Fe.**

If the railroads of the United States had been less liberal in expenditures for improvement of track and equipment during the past four or five years they would not only have been absolutely swamped in the attempt to do the business which has been thrust upon them, but they would have been unable to do business at a reasonable profit, in the face of the labor conditions that have prevailed.

I am inclined to think that earnings, taken as a whole, have reached the maximum for the present, or nearly so; but it is to be remembered that very few people in this country realize how fast the country is growing, and how soon business builds up around a new piece of railroad in a growing country.

There is a constant ascension of population, of production, and of consumption throughout the West, and while it may be that the maximum of earnings has been reached for the present, the next flood tide will take us far beyond anything we have had in the past, while the ebb tide, when it comes, will not take us to anything like the depths we have seen in the past.

I hesitate to express opinions on labor questions. I like to see labor well paid, and it is to be hoped that the necessity for reducing wages will not come. I do sincerely hope, however, that the time will come when it will be possible to make a selection and thereby get employees who take some interest in the affairs of the employer.

It is inevitable that during such times as we have had in the past four years, the grade of labor should deteriorate, because the best men have had an opportunity to get to the front. In certain lines of work I think our employees, notwithstanding high wages paid, are much less efficient than they were five years ago.

A decrease in business necessarily carries with it more or less decrease in operating expenses, and in case of falling off in business very much work, which is wholly improvement, which has been charged to operating expenses in the past, can be dispensed with.

There is no reason, providing rates are maintained, why net earnings should suffer a very severe decrease even though the crest of the wave of prosperity has passed. There is no excuse for any reduction in rates, because in the face of the heavy advances in every other commodity in the last four or five years rates have remained stationary, and railroad transportation is about the only thing which has not commanded a higher price than formerly.

*E. B. Thomas, Lehigh Valley.**

We have had a fairly good year. The coal traffic has been abnormal, in fact. We started the calendar year with the hard coal supply practically exhausted. More anthracite was produced in 1903 than in any previous year—between 58,000,000 and 60,000,000 tons. The business of the new year will depend largely upon the quantity of this product that is consumed during the winter. I am no prophet and, therefore, am not prepared to say what the business results of 1904 will be.

With the present cost of material and labor prevailing I do not see any chance of decreasing operating expenses. Wages will not go down in our business until they go down in every other vocation.

With regard to the present outlook I can only say that at the close of 1903 traffic is not quite up to the standard of a year ago, but the decrease in general traffic thus far is comparatively light.

*Roswell Miller, Chairman of the Board, Chicago, Milwaukee & St. Paul.**

The past year has been satisfactory in volume of business and in net results. Operating expenses have greatly increased, but in most cases this has been met by increase in gross earnings. The increase in operating expenses has been mostly due to increased wages and cost of material and fuel. The increase in wages has been large. The increased cost of fuel has been large in consequence of the increase in price paid the miners and increased margin charged by the operators.

There will be a reduction in the cost of material, and possibly in the cost of fuel, during the coming year, but there will probably be no reduction in wages, with the exception of some minor classes of labor, so long as gross earnings keep up to the present standard.

There will not be as much work in betterments in the coming year as in the past year, both on account of the cost of labor and material and because some roads have made all they need at present. The work will be continued when net earnings and the price of labor and material justify.

The betterments made have reduced the cost of operation, when they have been made judiciously, but the cost of operation has been increased by other causes. It would have increased still more but for the betterments—such as reduction of grades and elimination of curves—and the substitution of larger engines and cars. The result of the substitution of other permanent work for temporary work—as, for instance, iron bridges instead of wood—will not become apparent for a number of years.

There has been a greater expenditure for new cars and engines than usual. This will not be continued during the coming year except as to engines, which are still needed on many roads. There will be a comparatively small amount of construction during the coming year, both on account of the high price of labor and material, and because there is not at present much need of more roads.

The outlook for the railroads in 1904 is good. There is certainly enough business in sight for the next six months, and it is probable that the Presidential election will not affect business as seriously as in the past, because there is no vital issue at stake.

For the last half of the year, much depends on the crops. A single failure of crops will reduce business, but it will require more than one failure to produce very bad results. The condition of rates is good, and will continue so until business decreases considerably in volume.

The labor situation is the most vexing question at present in all branches of industry. There appears to be no way of working it out until the labor leaders and the majority of the laborers have some sense drilled into them by experience.

The strife for more wages and for a hundred other things produces so many strikes that the average wages received by the average laborers as a whole are no more than they were ten years ago.

*Samuel Spencer, Southern Railway.**

I do not think that the past year has been satisfactory to the railroads in the net showing. Freight congestion and increased cost of materials and labor have been unfavorable factors. With regard to business prospects, I do not think, so far as the South is concerned, that business will fall off very materially.

In railroad wages I do not think there will be any important changes during the year.

There is not likely to be any material increase in freight or passenger rates. There may be small and isolated cases of advance, but the conditions do not admit of any general advance. Expenditures for betterment and equipment must go on as the traffic of the country develops. In amount and extent they have probably culminated for the time being. But they can never stop. In this progressive country and age the railroad that is finished is dead.

The general prospects for 1904 are good. Not that business activity will be as great or as pronounced as it has been, but it seems to me that the indications point to a good steady business.

*C. S. Mellen, New York, New Haven & Hartford.**

The general outlook is good. I see nothing in the situation to warrant a statement that railroad net earnings will not be as large for the year ending June 30, 1904, as for the previous year.

Improvements made will not reduce operating expenses to any appreciable extent. The increase in the cost of materials and the increase in the cost of labor will offset, possibly more than offset, on many roads the reductions that would naturally be expected to accrue from the improvements made.

Betterment expenditures will probably be less in 1904 than in 1903. The general apprehension that now exists has a tendency to make managers of large railroads conservative in their expenditures, and the first reduction that will naturally attract attention will be that of improvements. On many roads the increased net earnings, if any is shown, as compared with previous years, will probably be the result of less expenditures in the way of improvements, especially that class of improvements that has heretofore been included in the operating expenses of the railroad.

*Commissioner L. P. Farmer, Trunk Line Passenger Committee.**

Through rates have been uniformly maintained during the past year, and I think that they will show a better average rate per mile than in any previous year. The general rate situation has been fairly good for both westbound and eastbound business.

There is nothing now in sight indicative of any unfavorable change in passenger business. I do not see why the present good conditions should not continue. Should there be a business depression in any line the passenger traffic would naturally be affected. But in view of the fact that the St. Louis Fair will be held this year I think that the passenger traffic of 1904 is likely to outstrip all previous years.

T. P. Fowler, New York, Ontario & Western.†

There probably, for a time at least, will be a curtailment in expenditures for betterments and improvements, partly on account of the prevailing comparatively high cost of material and labor and partly owing to a feeling of conservatism which naturally follows a period of unusual prosperity and of comparative ease in procuring the necessary capital required to meet the cost of such work. The cost of improvements and betterments in part will be paid for out of income and in part will be charged to capital account, according to the character of the work undertaken. The improvements already effected should result in a decrease in operating expenses.

The labor situation gives promise of improvement, because there are indications of a return to rational views. A period of excessive speculation, financial flotation, and of prosperity, real or apparent, affects all sorts and conditions of men, and all naturally make an effort while it lasts to participate in some way in the profits. A return to a normal or sound state brings with it sober reflection, and the wage-earner, sooner or later, like the capitalist, accepts the situation and is content with a reduced emolument.

I consider that the increase in the bonded or other indebtedness and in the capital stock of some of the companies, during the last two years, is warranted by the actual or prospective growth of their business. The increase as to other companies, no doubt, in a large measure has been speculative. The wisdom of expending such vast sums can only be determined by future results.

Edwin Hawley, Minneapolis & St. Louis and Iowa Central.†

So far as the business outlook for next year is concerned it is good, especially in general merchandise and coal. The crop conditions in Minnesota and South Dakota so far are fairly satisfactory. While it is hoped that the crops will equal the average yield in past years, it should not be overlooked that the increase in tonnage of merchandise and manufactures gives evidence of important commercial development in that section of the country.

Some improvements and betterments now under way still remain to be finished, but if there should be a reduction in the volume of traffic during the coming year it will be practicable to effect greater economies in the cost of maintenance and transportation without detriment.

James J. Hill, Great Northern.†

In my opinion the high cost of production in manufacturing districts has limited the market for output. In order to give labor steady employment manufacturers must be able to find a market. The home demand is greatly restricted and the high cost will go far to prevent exports. Until there is such a readjustment as will enable manufacturers to export their products, labor, as well as other conditions, will suffer.

Transcontinental railroad rates have not advanced, notwithstanding the high cost of wages and material. The enormous amounts of money spent by Western railroads in permanent improvements will go far toward enabling them to maintain present rates unless there is a heavy falling off in the volume of traffic.

The railroad in China for which the Russo-Chinese Bank is to open subscriptions Dec. 27, is an east and west line about 150 miles long, extending from the completed Belgian railroad at Cheng-ting-fu, 175 miles southwest of Pekin, westward to Tai-yuen-fu, in the province of Shansi. The concession was granted some years ago. The country on the line is densely populated, and according to Baron Richthofen, the chief authority for the geology of China, the province of Shansi is likely to be the Pennsylvania of the future. The larger part of it is a plateau elevated about 5,000 ft., with an area of 30,000 square miles, said to be one vast coal field, bituminous west of a central range of hills and anthracite east of it—enough, Richthofen says, to supply the whole world for thousands of years. The country is also rich in iron ore of high quality. A few hundred miles of railroad in such a country may well be of greater importance than the long Siberian Railroad; but the development of the mineral resources of the province must necessarily be slow, or what we would call slow in this country.

*From an interview printed in the New York *Sun*.

†From an interview printed in the New York *Times*.

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

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The automatic block signals to be installed on the main lines of the Terminal Railroad Association of St. Louis, as announced in the *Railroad Gazette* of November 27, are to be of the three-position type, and the number of signals to be put up is about 60. These signals will be worked by electric motors, and the glasses for the night indication will be arranged in the "continuous-light" spectacles of the Union Switch & Signal Company, which has the contract for the work. The colors for the night indications are green for proceed, yellow for caution, and red for stop. This will be the first installation of automatic signals, so far as we can recall, in which a red and a yellow glass are used under conditions where the observer has nothing but the color to inform him whether it is a home or a distant signal that he sees. The three-position signal is both a home and a distant. The regulation distant signal, giving distant indications and nothing else, is always distinguishable from a stop signal by its location or by the situation of the arm and light on the post, so that where yellow is used, the engineman can always know that he should find in that place a yellow light, not a red one; hence we have now a new condition. In view of the difficulty which is said to be experienced in quickly distinguishing a yellow signal light from a red one, the experience with this St. Louis installation will be watched with interest. This experience may easily afford no instructive information, for trains are not likely to get into trouble, even if a yellow light is mistaken for a red one. Two elements combine to produce this situation. First, an engineman with a good headlight can, at ordinary speeds in fair weather, see the signal blade before it is necessary to come to a full stop, or even, in many cases, to shut off steam; and so will not be wholly dependent on the colored light; thus if he is not seriously delayed, he may not take the trouble to report his difficulty with the color of the light. Second, the red light will never give a doubtful indication, and therefore the doubts, if any, will be on the side of safety. A runner may be in doubt whether he should go on, and therefore may shut off steam, but he will never need to doubt the stop signal—the red light, for no amount of smoke or fog can make it look like yellow. Notwithstanding these circumstances, it is much to be desired that the colors be tested strictly on their merits. If American signal engineers are to permanently maintain a difference between their stop signal lights and their distant or caution signal lights, they should not rest satisfied until it is an unmistakable and universally recognized difference.

"A signal imperfectly displayed . . . must be regarded as a stop signal, and the fact reported" to a designated officer. This rule (No. 27) of the Standard Code undoubtedly requires an engineman to stop at a color signal, where he cannot certainly determine the color, and to report the fact; but the rule is hard to enforce, and it is to be feared that it is generally disregarded, except in cases where the engineman himself deems the stop necessary for safety. As remarked in the preceding paragraph, the stop is not always necessary for safety. But if the signal department is to be spurred to higher standards of design and maintenance, enginemen must record their complaints every time they encounter anything that is below the required standard; and the only way to secure such records is to discipline those enginemen who neglect to make reports. A certain superintendent recently tested some of his enginemen by showing them imperfectly displayed lights in automatic enclosed disk signals; and he found that they all with one accord proceeded just the same as though the go-ahead signal had been perfectly displayed. A near view of the signal might indeed assure the runner that the disk was not in the stop position; moreover, an automatic signal in specific cases may safely be passed while it indicates "stop," if the track is seen to be clear. Most rules permit this to be done, after the train has been brought to a full stop. But, notwithstanding all this, an essential thing in securing satisfactory service from a signal is to get a true record of its faults, and only the engineman can do this. The condition and the behavior of signal lights should be brought to the highest possible standard. If this is to be done, it may be necessary to forbid enginemen running at night to pass a blade standing at clear, unless the light also shows clear. It would require courage to carry out such an order as that, for it might increase the number of unnecessary stops; but is there any other way to accomplish the end in view? The foregoing considerations call to mind the practice in vogue on the Chicago & North Western, of giving false stop-indications at automatic signals for the purpose of testing the enginemen's obedience to the signals; and they tend strongly to confirm the wisdom of such tests.

Tramps.

Justice Fort, in charging the grand jury of Middlesex county, New Jersey, suggests the only method of riddance from tramps which has been found to be practicable. Two murders of tramps, probably by other tramps, have occurred in that county this year, and the Justice charges the jury to consider whether the authorities are doing their duty to the end of ridding the whole county of this danger. He also calls attention to the law which authorizes magistrates to sentence tramps to work with ball and chain.

Charges to grand juries to investigate abuses too often lack full knowledge and precision, but this one indicates the correct theory of dealing with wandering dangerous vagrants. It must be by wholesale, and a county is a quite small enough unit. The police can have no assurance that they are restraining the dangerous classes unless at the same time they keep watch over the suspicious classes; this means keeping a record of the vagrants in a considerable territory. The railroad company which is sporadic and not systematic in prosecuting tramps—securing arrests in flagrant cases only and dealing with each town by itself—is trying to sweep back the ocean with a broom. It is a costly abuse, to be met by organized and well-known methods which are not very costly.

When Mr. Loree began his campaign on the Pennsylvania Lines West of Pittsburg, it was not until after a thorough investigation and report. His expert spent a long time, disguised as a tramp, traveling over the lines and learning the underside, getting the "worm view." He then investigated the same territory as an official inspector and got a "vertical projection" of the way the officers of the road and of the communities dealt with tramps. With this full detailed knowledge, which has been made available to other railroad officers by several publications in the *Railroad Gazette*, Mr. Loree entered on an undertaking which was bound to be successful in freeing his lines from the expenses and dangers due to this cause.

He appointed a chief of police for a division of the road and through this officer organized the police force of that division. This was in 1894. In the next year or two he extended the work to two other divisions. By 1897 he had five divisions organized. In 1894, these officers, working in harmony with the local authorities, secured the arrest of 143 offenders; in 1895 the number was 1,800; in 1896 it was 2,395 and the next year the total was 5,514, of which 4,531 were arrested for unlawfully riding on freight trains.

Although it is important to proceed against the whole army of the enemy at once, caution must be exercised not to fill up the jails too rapidly. If you inflict much inconvenience or expense on the public, the enthusiasm of the people for the punishment of law breakers soon becomes chilled. Mr. Loree found that at the outset it was necessary to restrain his men and not allow them to arrest all of the tramps and train riders they could get hold of. It was also clearly shown by his experience that the genuine "hobo" has little aversion to an ordinary jail; he finds it a quiet place in which to rest and reflesh himself. For the worst offenders it was necessary to find a workhouse managed in such a way as to be a real terror to the seasoned brakebeam rider.

A discovery, in connection with the police problem, is that the expense of the establishment is by no means so great as at first seemed likely. In the summer of 1900 a division of the Erie road was organized, on a plan similar to that of the Pennsylvania lines west, and it was found that but few new men were needed. The essential thing is to have a competent head; with this essential preliminary the organization of a department consists chiefly in putting under the authority of this man all of the watchmen and other employees who are engaged in work of a police nature. The chief officer keeps well informed of what is going on along the lines of the company, and in the local courts, and thus is able to make the work of each individual police officer effective in a way impossible without the central organization.

In the working out, it has been found not at all difficult to get, by a combination of diplomacy and firmness, the hearty sympathy and co-operation of the city and county authorities. Mr. Loree remarked in one of his papers on the police question that a large railroad company is one of the most distinguished citizens of the State in which it does business, and as such it should take all proper means to co-operate with the officers of the law.

The Prospects for 1904.

At the close of 1903 letters were sent to the presidents and general managers of several hundred railroads asking information to be used in totals only about new equipment which the road expected to order during the year and for which it was not yet in the market, and for a general statement as to new work to be done which had not at that time been contracted for or definitely decided, and asking also an expression of opinion as to the general prospects for business. As the budgets of most railroads are not made up until in January, or even later, the replies were, of course, very incomplete, but they are interesting as coming from every part of the country and expressing independent opinions of the prospects of a great number of properties large and small. Approximately 200 answers were received. Of the roads replying, 95, many of them being small and unimportant roads, had nothing to report; 55 had definite work in prospect for which orders had not yet been placed or asked and 50 replied that they would take the matter up later but as yet had arrived at no decision. Thirty roads reported new construction work to be done but not yet begun or contracted for; 14 roads expect to do more or less extensive bridge work, while five reported considerable amounts of ballasting to be done but no other construction work. The number of companies which expect to buy cars and locomotives for which they are not yet in the market is about the same as the number that will undertake new construction work.

An attempt was made to classify the replies of these railroads having definite work in contemplation according to their evident attitudes of mind in regard to prospects, and 21 of the 55 letters were distinctly hopeful in tone, six expressed doubt as to the situation and three were pessimistic. Of the roads which either had not yet made up their budgets or which reported no work in contemplation, only three were optimistic as to the probable developments of the year; 12 expressed doubt and 11 were pessimistic.

The statistical value of a collaboration of rather guardedly expressed opinions may be questioned, but the same correspondence last year was quite uniformly optimistic in tone and a considerably larger proportion of roads had their minds made up that the year ahead of them was a good time to do things, while to-day the presidents and managers are quite generally disposed to wait to see how crops, the presidential election and the stock market are going to act before they undertake large betterment work. In another column we quote from the daily press the opinions of a number of well-known railroad men about the situation. The following expressions are taken at random from our own correspondence on the

subject, and we are not at liberty to print them under the names of the writers:

"I am sorry that I cannot give you anything very definite in this matter for the reason that the amount of business we will probably be favored with next year will have very much to do with our expenditures for improvements, etc. The present feeling is to undertake considerable less work than a year ago. . . . Our maintenance expenses will perhaps be somewhat less; we will not undertake as elaborate work as we did in 1903 unless there is a change for the better in the business outlook.—*General Manager.*"

"Should we need any further equipment or wish to make any other improvements on the line we would have no hesitancy about doing it as I believe the conditions warrant it, as the country seems to be very prosperous with the exception of some wild speculation which always has to suffer.—*General Manager.*"

"We are not pessimistic, but until the outlook is brighter we shall endeavor to keep things moving as they are and not try to crowd things.—*General Manager.*"

"We expect to do a certain amount of work, but the volume will depend entirely upon the action of our Board and the general conditions as they may exist after the opening of the year.—*Vice-President.*"

"Nothing definite has been determined as all depends largely on future financial conditions.—*General Manager.*"

"I want to build a branch of about 45 or 50 miles, and possibly would have had it built before this were it not for the epidemic of suing railroads that has prevailed in Texas for the past three or four years and is growing worse every day. It has been so easy to secure judgments for large amounts against railroad companies that a great many people have engaged in the business, and, I regret to say, have been tremendously successful, so that hundreds of thousands of dollars earned by Texas railroad companies have been diverted from their legitimate channels into the pockets of lawyers and people claiming to have been injured on railroads. A few months ago we were compelled to call a halt on all improvements and devote our energies in the direction of saving enough money to pay operating expenses, taxes, and the larger amounts that are legally confiscated each month.—*Vice-President.*"

"I will say that the outlook in the territory through which we run is very good for 1904. I believe that business will exceed that of 1903.—*General Manager.*"

"We do not expect to spend much on anything until after we see the new crop in sight.—*President.*"

.."Nothing will be done until some time next spring when conditions and business outlook will determine our action. I think that all railroad companies are very much alike just now in holding back and awaiting developments; but if prospects open up fairly well next spring I look for a continuation of many of the improvements begun by railroad companies which have been temporarily suspended.—*Vice-President.*"

Summary of Traffic Tendencies, Railroads Reporting June 30.

The annual reports of about 50 railroads receive extended review in the *Railroad Gazette* at the time of their appearance, and approximately 40 of these roads report operations for a fiscal year ending June 30. The June 30 reports are now all in, and a general resumé of them all shows certain definite tendencies which are holding true, to a greater or less degree, in all parts of the transportation system of the country. The 1903 year has been an exceedingly prosperous one, as shown by the continued increases in gross earnings above the extraordinary gains in 1901 and 1902.

A graphic diagram has been prepared from the returns of 17 roads, selected for purposes of comparison as representing practically every part of the country, and as operating systems not radically changed within the last four years. These railroads are the following: Atchison, Topeka & Santa Fe; Great Northern; Baltimore & Ohio; Illinois Central; Chesapeake & Ohio; Louisville & Nashville; Chicago, Burlington & Quincy; New York, New Haven & Hartford; Chicago, Milwaukee & St. Paul; Norfolk & Western; Cleveland, Cincinnati, Chicago & St. Louis; Philadelphia & Reading; Chicago & North Western; Southern; Northern Pacific; Wabash; Erie.

The diagram shows the increases in gross earnings, operating expenses, net earnings, gross per mile and net per mile, computed from the figure for each of these items for the year ending June 30, 1899, and serves to fix in the mind the relative evenness of increase, on the systems in their entirety, of the three chief elements in operating returns. The downward turn in net per mile of road worked, although it ends the line at exactly the same figure of proportional increase as is shown by gross per mile, nevertheless illustrates a tendency which would be much more graphic if the returns could have been carried on for the six months ended Dec. 31. That tendency is the rapid increase in operating expenses, continuing after the increase in gross earnings has begun to slacken. So long as gross earnings held the pace, the effects of the piling up of operating expenses were chiefly negative, in their relation to net earnings. But there is little doubt that a similar diagram which we shall print next year will show a sharp dip in gross and in net in-

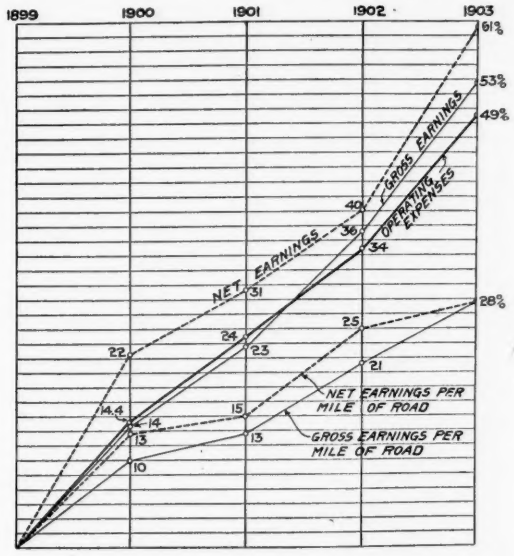


Fig. 1.—Percentages of Increase Over 1899, 17 Roads.

creases, widening into a considerable gap below the increases in operating expenses.

The returns of the New York Central are not included in Fig. 1, partly because the Boston & Albany operations and those of certain other lines were only accounted during a portion of the period covered, but chiefly because increases in operating expenses on this road have been so much greater in proportion than on the others that the effect on the average would have been misleading. This is shown by Fig. 2, where the combined operating results of the New York Central and Boston & Albany are plotted, together with those of the Pennsylvania. The New York Central returns cease with the year ending June 30, 1903. The Pennsylvania returns are continued to October 31, and for purposes of comparison with 1899, five-sixths of each of the totals of that year was taken. The Pennsylvania and the New York Central are perhaps giving as striking examples of rapidly mounting expense accounts as any large road in the country at the present time. For the six months ending Dec. 31, 1903, (partly estimated), compared with the same period in 1902, the New York Central earnings from operation increased $2,335,000, but the expenses increased $2,665,000, leaving a decrease of $330,000 in net earnings from operation. Fig. 2 shows that the unfavorable upward trend

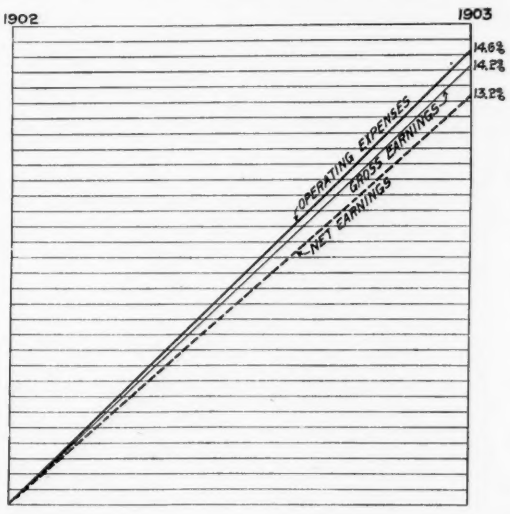


Fig. 2.—Percentages of Increase, 10 Months Ending Oct. 31, 101 Roads.

of the expense account has been felt more sharply and for a longer time on the New York Central, but that the Pennsylvania is now in much the same condition, as indicated by the turn in the graphic lines. It is very evident that there is need of careful retrenchment in this matter of expenses. While traffic was congested and more freight was offering than could possibly be handled, as during the Pittsburg freight blockade of 1902, expenses were a minor consideration compared with the mere transaction of business and keeping the lines open, but 1904 will doubtless show an important change in this respect.

Fig. 3 is a diagram showing the percentages of increase in gross earnings, operating expenses and net earnings of 101 roads for the ten months ending Oct. 31, 1903, from the similar period last year. For the collection of railroad statements from which the diagram was prepared we are indebted to the *Commercial and Financial Chronicle.* It will be seen that the average of this large number of roads carried on into the time when the rapid increase in gross earnings was checked, illustrates conservatively but with great definiteness the trend of affairs. Operating expenses increased fastest of all, the change amounting to 14.6 per cent. Gross earnings come next with 14.2 per cent., and net earnings show the smallest increase of the three, 13.2 per cent. Returns to date would widen each of these gaps considerably.

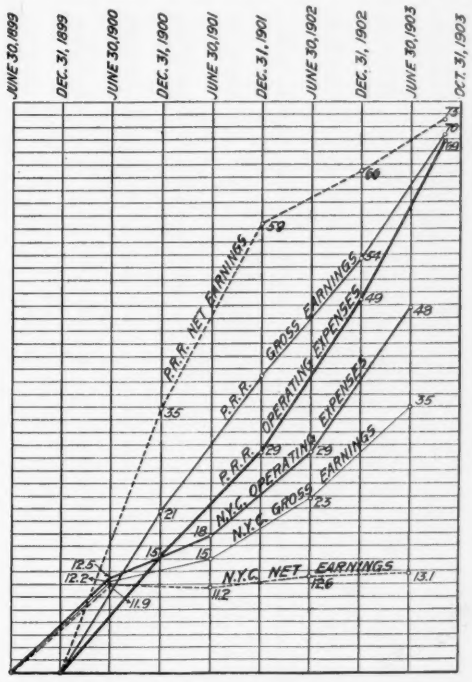


Fig. 3.—Percentages of Increase Since 1899, New York Central and Pennsylvania.

One characteristic of the last two or three years which was strongly accentuated in 1903 has been the large expenditures for permanent betterment work out of earnings. The sums specifically set aside by some of the larger roads, such as the Pennsylvania and the Baltimore & Ohio, for reduction of grades and curvature to enable them to haul full train loads from their traffic summits to tide water have been discussed previously in connection with the annual reports of these roads; the Pennsylvania is building railroad after railroad paralleling its lines between Philadelphia and Pittsburg with this in view. But apart from these sums specially appropriated out of earnings, the tendency to increase the annual charge of maintenance of way and structures and maintenance of equipment has been quite universal. The following table shows the returns from 12 railroads out of the group reporting June 30 and serves to illustrate this tendency.

	Per mile of road. Maint. way and structures. 1903.	1902.	Maintenance of equipment. 1903.	1902.
Cleveland, Cin., Chic. & St. L.	$1,525	$1,329	$1,682	$1,496
Atchison, Topeka & Santa Fe	1,168	782	1,068	1,001
Norfolk & Western	1,608	1,271	1,775	1,392
Missouri, Kansas & Texas	1,068	1,058	634	599
Chicago, Milwaukee & St. Paul	1,100	1,093	585	509
Illinois Central	1,376	1,321	1,461	1,241
Erie	1,743	1,762	2,661	2,499
New York Central	3,058	2,590	3,179	2,792
Great Northern	960	895	566	519
Chicago, Burlington & Quincy	1,083	933	907	900
St. Louis & San Francisco	935	916	711	680
Union Pacific	919	1,041	1,045	800
Average, 12 roads	1,378	1,249	1,356	1,202

It will be seen that these 12 railroads together spent $1,552 a mile more on maintenance of way in 1903 than they did in 1902, and that they spent $1,846 a mile more on maintenance of equipment. The average expenditure for maintenance of way and structures in 1903 was $1,378 as against $1,249 in 1902, an increase of $129, and the average amount spent for maintenance of equipment was $1,356 as against $1,202 in 1902, an increase of $154. Another way in which the results of the heavy expenditures out of earnings during the last few years of great prosperity are shown is in the figure of the average train loading. The figures given are for revenue train load, and do not include company's freight. The following table compares the train loading of 18 roads in the June 30 group during 1903, 1902 and 1901. What has been accomplished by the larger expenditures for heavy equipment and for general improvements to the line is pretty well shown by the increased average load in tons.

Revenue Train Loads in Tons.

	1903.	1902.	1901.
Buffalo, Rochester & Pittsburg	441	424	406
Atchison, Topeka & Santa Fe	279	247	242
Chesapeake & Ohio	493	508	511
Chicago, Milwaukee & St. Paul	244	254	236
Illinois Central	288	275	235
Great Northern	447	417	381
Northern Pacific	344	346	324
Wisconsin Central	304	287	260
Lehigh Valley	485	467	467
Erie	406	376	375
St. Louis Southwestern	252	232	210
Minn., St. Paul & Sault Ste. Marie	305	315	314

Chicago, Burlington & Quincy.....	265	218	201
Chicago & Alton.....	361	316	288
Wabash	302	285	283
Baltimore & Ohio.....	416	406	381
St. Louis & San Francisco.....	195	187	200
Union Pacific	403	418	365
Average, 18 roads.....	346	332	315

To show further the amounts which have been charged to the two maintenance accounts as part of general expenses the next table contains a list of the seven railroads in the country which at their last report had exceeded an expenditure of $5,000 a mile on maintenance of way and maintenance of equipment together. This table includes three roads for which the statements are nearly a year old, as their report is dated December 31 instead of June 30.

	Miles.	Main. of road and equipment, per mile.
Pennsylvania Railroad	3,706	$8,552
Philadelphia & Reading.....	1,010	7,842
Pennsylvania Lines West.....	1,338	7,152
Lackawanna	948	6,430
Lehigh Valley	1,392	6,317
New York Central	3,423	6,237
New Haven	2,027	5,144

The most striking thing about these figures is that in the case of the Pennsylvania lines east an expenditure of $8,552 per mile of track was distributed over 3,706 miles, and that on the New York Central an expenditure of $6,237 was distributed over 3,423 miles.

As a result of this policy, which has been quite general during the last two years among well managed roads, and even among badly managed roads, it would appear that the railroads of the country were in better shape now for retrenchment than ever before, in case it becomes necessary during the present year to look closely after the expense account as now seems highly probable. In previous years of inflation larger amounts of new mileage have been built, and when the roads were overtaken by a period of stringency they had in many cases a loose and ill-organized system to look after, a system not adapted for economical handling. But the railroad extension in 1902 and 1903 has been moderate, amounting this year to, say, 2½ per cent. of the total mileage of the country as against the addition of about 9 per cent. to the total mileage of the country made in 1887 and of about 10 per cent. in 1882. It seems altogether likely that it will not only be possible in an emergency to greatly reduce the extraordinary expenses of the last few years on a considerable number of roads, but that in some cases they will reduce themselves naturally as the specific pieces of work undertaken reach completion. It is quite conceivable, therefore, that 1904 may show the seeming anomaly of decreased gross earnings accompanied by increased net earnings, on a considerable number of railroads.

NEW PUBLICATIONS.

The Factory Manager and Accountant. By Horace L. Arnold. 432 pages, 6 in. x 9 in. Illustrations and index. New York: The Engineering Magazine, 1903. Bound in cloth, $5.

Inasmuch as we fully believe the statement of Mr. George S. Morison that the world is entering upon a new epoch and that the profits of the future will be made not by buying cheap and selling dear but by reducing the cost of production—then this book will be of added value to the progressive factory manager who hopes to win in the inevitable battle which will end in the survival of the keenest. The book is thoroughly practical and deals not with academic or untried theories but with systems which are in successful use in many of the largest shops in the country. The first two chapters of the book discuss general principles of factory economics and the last eight chapters of the book give detailed accounts of the cost finding system of the Link Belt Engineering Company, Nicetown, Philadelphia; the forms of the Link Belt Engineering Company, the cost finding system of the Bigelow Company, New Haven, Conn.; the C. B. Cottrell & Sons Company, Westerly, R. I.; the Potter & Johnson Company, Pawtucket, R. I.; the Wells Brothers Company, Greenfield, Mass., and systems and forms of the C. W. Hunt Company, West New Brighton, N. Y. The blanks and forms referred to are accurately reproduced, each one having its size given, together with the color and kind of paper on which it is printed.

The author appreciates the fact that the factory manager is usually appalled by the series of record forms needed and the great amount of labor of writing the records, but he concludes that the manager cannot give his mind fully to his own task of making the great things right unless the small things are thoroughly systematized and taken from his personal supervision. One of the difficulties in putting in practice a factory accounting system is the dearth of good men who have the energy and ability to carry out the work. The attitude of the author on this question is as follows: "Those who cannot assume a thoroughly subordinate mental attitude are not useful to the factory manager; they may be abundantly capable, but as between the subordinate of too much ability and energy, who must be constantly held in check, and his fellow who has perhaps equal mental perception but not quite so much combativeness and so requires at times a little pushing, the manager's choice falls on the docile one. An energetic subordinate is the more valuable in emergencies, but emergencies are evidences of imperfections somewhere and may be avoided very largely by the teaching of foresight-giving experience." The author evidently has in mind the ideal system from the manager's point of view in which the men and machines become part of one another, merely obeying the conditions laid down in the order blank.

The importance of thorough cost finding systems is emphasized. Factory managers who add but a small increment of labor to a product already heavily indebted to previous handlers often lose sight of the labor cost included in their rough stores purchases. The author says: "Thus, in the case of the special maker, whose operations are limited in scope, it is clearly to his advantage that the suppliers of his raw material should be efficient cost keepers, and thus be able to lower the cost of their product to him while at the same time increasing their own profits by his increased purchases." This principle again enunciates the truth of Mr. Morison's theory that the ultimately successful producer will be the one who has learned how to reduce the cost of production to the lowest possible limit.

Experimental Researches on Reinforced Concrete. By Armande Considère. Translated and arranged from the French by L. S. Moisseiff, C.E. 188 pages, 6½ in. x 8½ in. Illustrations. New York: McGraw Publishing Company, 1903. Bound in cloth, $2.

Those familiar with concrete-steel construction need no introduction to M. Considère. His papers before the French Academy of Sciences and elsewhere are recognized classics but heretofore complete translations have not been available. This book is a compilation of these papers, arranged and classified so as to make one coherent treatise. The use of concrete, reinforced with metal rods, has increased rapidly within the last few years, due chiefly to the lesser first cost of concrete-steel construction over plain steel construction and the low maintenance charges. Accurate calculations by a bridge engineer of one of our western railroads showed that about 25 per cent. was saved in first cost by using 140 ft. concrete-steel arches instead of ordinary steel trusses. The principal objection to the use of concrete-steel is that no positive data exists on which to base designs and from which accurate calculations can be made. The variable quality of the concrete and the uncertainty as to its homogeneity and strength are also valid objections to its use. M. Considère has made extensive experiments on the functions of the reinforcing metal and has studied the theory of flexure of concrete-steel beams. It cannot be said that the book is thoroughly practical as the experiments were not made on full size specimens and no practical formulæ are given from which designs can be made. Nevertheless the book is important as it lays down fundamental principles. In this respect it bears about the same relation to concrete-steel construction, that the calculus bears to practical mechanics. The knowledge of the one, without the other, is apt to lead to serious errors.

TRADE CATALOGUES.

The American Steel & Wire Company's list of products is printed in a sober way, without illustrations, in 24 pages of a neat pamphlet. It is all the more impressive because it is not illustrated. A bare list of great facts does not need pictures to get or to hold attention and interest. Its list of steel plates for locomotive and engine work and of soft steel for ship plates and other heavy work, includes stock material varying in thickness from 1 in. down to No. 16 gage; in widths of from 12 in. to 115 in., and in lengths from 130 in. to 375 in. The wire list includes every grade and size of wire made from copper, iron, aluminum and different grades of steel. It is so grouped in the pamphlet as to be easily get-at-able. The astonishing amount and variety of the uses of wire can be grasped in no other way so easily as by reading this list. We commonly think of wire as being round in section, but the company makes all sizes of wires, flat, square, oval, half oval, half round, convex, concave, corrugated, angular, diamond shaped and triangular.

The International Creosoting Co., of Galveston, Texas, issue a muslin covered small volume of considerable value. Its title is, "A Treatise on Wood Preservation," and, although it is far from being a treatise, it describes well the different methods of treating structural wood which this company uses, namely: Creosoting with dead oil of coal tar; the Allardyce process with zinc and oil; the Wellhouse process with zinc, glue and tannin; and the Burnettizing process with zinc only. The company is operating two large plants, one at Beaumont, where the big cylinder is 9 ft. in diameter by 136 ft. long; and another at Texarkana, with cylinder 9½ ft. by 165 ft. Both these plants are fortunately located in a timber region where for years there will be an ample supply of long-leaf yellow pine, short-leaf and loblolly pine, cypress and many varieties of gum.

Downing Metallic Packing, Tippett piston safety valves, and Hayden relief valves are well described in a recent catalogue of the N. L. Hayden Manufacturing Company, Columbus, Ohio. The metallic packing is guaranteed to last not less than 25,000 miles in locomotive service and it is claimed that rings have lasted over 100,000 miles in severe service with boiler pressures of 225 lbs. The packing consists essentially of a vibrating cup, segmental packing ring, follower, and spring. The Hayden relief valve for tank cars meets the requirements of the Pennsylvania and has been approved by Mr. A. W. Gibbs, General Superintendent Motive Power.

The Union Switch & Signal Company, Swissvale, Pa., has issued Section 14 of its Catalogue of Interlockings and Signaling devices. This section consists of 27 pages and is devoted to relays, of which all of the principal designs made by the company are shown in full page perspective drawings. Detail parts are not illustrated, as orders for repairs can be most conveniently made by sending a sample of the part which needs to be removed. Of Model No. 1 the catalogue says that several of them have worked very successfully during the past year in a "lightning infested district." The distinctive merits of each relay are briefly described.

The Yale & Towne Mfg. Co., New York, has prepared a little eight-page folder which is entitled "Three Labor Savers." The object of the folder is to present to manufacturers some pertinent facts about handling material in shops or yards with the use of chain blocks. Some interesting comparisons are given of the capacity and speed of three types of chain hoists. This company makes the Triplex block, which is spur geared, the Duplex block, which is screw geared, and the ordinary form of differential block. Prices and other information about all three forms of hoists are given in the folder.

Detroit Graphite Mfg. Co., Detroit, Mich., has just issued a little folder telling about Superior graphite paint; how it is made, where it may be used to the best advantage, and what it does when in use.

A new form of steel and cement fireproof construction named "Ferroinclave" is described in a catalogue just issued by the *Brown Hoisting Machinery Company*, Cleveland, Ohio.

Superheated Steam Freight Locomotive—Saxony State Railways.

BY CHARLES R. KING.

The engine here shown has just been constructed for the Saxony State Railways by the Sächsische Maschinenfabrik of Chemnitz (Saxony) for work upon a road having heavy grades of 2.5 per cent. and 1.4 per cent.

It is a bituminous coal burner of somewhat powerful type for Europe, having nearly 12 tons (U. S.) tractive effort. Its peculiarities are numerous and comprise a superheating apparatus in the smoke-box for reheating the exhaust steam from the high-pressure cylinder in its course to the low-pressure, while the trailing wheels, although connected with the drivers, swivel on a universal ball pivot for the purpose of diminishing the excessive resistance of a long, rigid wheel base on short-radius curves. In the constructive details there are several suggestive features. In place of the usual short bit of pipe which has to satisfy the demands for a stack in modern locomotives, its stack is lengthened by a hinged extension which adds greatly to the draught through the flues, and in the place of domes there is a long cylindrical reservoir for considerably augmenting the steam and water spaces without involving a large boiler which would often exceed the limit of weight admissible in Saxony for each axle, and possibly be too large for the gauge limits. The valve motion is also novel, being a combination of Walschaerts' with a part of the Joy arrangement—this latter only having been introduced as an expedient, for there was not room enough for the usual crank-rod drive of the Walschaerts' gear because of the extent to which that rod would have stood out from the side of the engine beyond the overlaying main rods and connecting rod. These rods have necessarily been arranged here through the use of both inside and outside main-frames.

There is a separate battery of superheating tubes on each side of the smoke-box, each of the series containing 17 serpentine tubes formed of 8 loops, which loops diminish rapidly in length as they descend towards the bottom of the smoke-box, in order not to obstruct the side flues. These tubes are ¼-inch steel, and 1½ inch inside diameter. Their extremities, top and bottom, are clamped to longitudinal pipes which extend along each side of the smoke-box—above and below. These larger pipes are connected at their rear ends by two traversing pipes—a straight one at the top and a curved one at the bottom, each one just clearing the line of the flues. All six pipes are steel castings of 5⅛ inch internal diameter and about ½ inch thick. The direction taken by the steam after leaving the H. P. cylinder, is as follows: From the exhaust of the high pressure cylinder, the receiver is carried upwards and around the left-hand side of the smoke-box near to its top, where a forked pipe divides the stream, one part going to the left-hand distributor, and the other, via the straight transverse pipe, to the right-hand distributor pipe. The steam then descends through the coils to the two collector pipes at the bottom of the smoke-box, and thence, by means of a leg branch on the lower curved transverse pipe, it is led down into the low pressure valve-chest, the degree of superheat attained in its course being about 40 deg. Centigrade.

A safety valve fixed in front and connected to the front end of the left-hand distributor pipe, relieves the apparatus of excess pressure; and it is kept supplied with saturated steam when the engine is not working by means of a special steam tube. To control the superheating, there is, on a level with the blast pipe, a sheet-iron heat and spark deflector pivoted in the center line of the smoke-box and operated by the sector-lever shown in the engraving. This deflecting-plate ordinarily directs the flue gases outwards into the superheater coils on either side, but it can be rendered inoperative by inclining it forward from its normal position so that the gases pass direct to the chimney. When placed horizontally, it permits of tube

sweeping. It is so cut out as to clear the projecting loops of the serpentines, and also the blast pipe, when it is turned on its pivot. The circle described by its longest end is made to avoid the top bends of the superheater pipes in the front of the smoke-arch, while beyond its reach the foremost rows of serpentines are made much longer so as to nearly meet across the top of the smoke-arch. The elbow steam pipe to the high pressure cylinder is 5⅜ in. in diameter and the receiver pipe, also of ¼-in. steel, is 6¾ inches diameter. The blast pipe has an internal diameter of 8¾ inches, and is contracted to 6 inches at the nozzle, which is fixed and stands on a level with the top row of flues. The outside steam pipe from the steam reservoir to the smoke-box is a steel casting of 5½ inches inside diameter. The base of the chimney is cast iron 17⅛ inches inside diameter, and the hinged extension is sheet iron. The smoke-box has a length inside of 7 feet, 8¾ inches, and a diameter of 6 feet, 6¾ inches, and is made of ⅝-inch plate and provided with side doors to get at the screw clamps of the serpentines. It is clothed with sheet iron like the boiler, and has a cinder-spout 7⅛ inches diameter at the top, but increasing in diameter at its lower end to give a good clearance for lumpy residues.

The engine slide valves have Trick steam ports, and are balanced according to the Fester system. There is nothing employed for the valves that is unusual to other Saxon engines, being crucible cast iron. The piston-packings are made by the Philadelphia Metallic Packing Company. The cylinders are 20⅞ inches and 30¼ inches diameter, and the piston stroke is 24⅞ inches. Less thickness of metal is used for the cylinders than is general for American locomotives. Their back ends are cast solid with the cylinder and the front covers are not drilled for the studs, but are held to their seats by outside cover rings. The cylinders are lagged with a thick cork composition. Drain cocks are fitted as usual, but only for use after a long stop, for the superheater effectively prevents all cylinder condensation.

The engine has the latest type of Lindner starting device. The older system is well enough known with its perforations in the inside lugs of the high-pressure valve, and in which, when the degree of steam admission is in excess of 80 per cent. of the piston stroke, the reversing-gear itself opens a four-way cock admitting steam from the smoke-box elbow-pipe to the low-pressure valve-chest, on a level with the valve-yoke, for starting the low-pressure piston in positions where the high-pressure valve completely covers the H. P. steam ports, and, there being no intercepting valve, the live steam from the low-pressure valve-chest passes back by the receiver unimpeded into the exhaust cavity of the high-pressure valve. This would cause back-pressure on the (front) end of the high-pressure piston, were it not for the perforations in the high-pressure valve which allow the same steam to leak through into the (back) steam port and thus equalize the efforts on both sides of the high-pressure piston.

In the new modification as applied to this locomotive, the auxiliary steam enters at the middle of the cylinder barrel, in both the cylinders, and is distributed there by first passing through a small sliding valve with a double piston on the end of the low-pressure valve stem. This valve is set so as to admit steam to either high-pressure or low-pressure cylinders at unfavorable positions of their valves. There being no intercepting or cut-off valve in the receiver, the engine is worked precisely as a single-expansion locomotive, so far, at least, as the engineer is concerned, and, according to personal observations, the engine starts easily with any load up to 1,000 tons. A diagrammatic outline here given will explain the working principle of the new Lindner valve at a moment when the low-pressure piston is to start (the high-pressure valve being closed). The crank position for each piston is indicated in the same sketch.

The valves have a maximum travel of 4⅝ inches for the high-pressure and 4¾ inches for the low pressure; a lap of 1⅛ in. for the high-pressure and $1^1/_{16}$ in. for the low-pressure; a lead to exhaust of $^3/_{16}$ in. for the high-pressure, and nil for the low-pressure. The combined Walschaerts' and Joy valve-gear is interesting, and readers may judge of the motion for themselves by means of a few strips of card or tin and some pins. All parts of the valve-motion lie in the same vertical plane so that there are no torsional stresses. All rod ends, hangers, links and bars have oil cups in their ends. The side rod pins of the second pair of driving wheels allow a play to the rods of ⅝ in.

This locomotive, considered solely as a carriage, is notable for the flexibility of its long wheel-base, the total length of which is 25 ft. 2½ in., including the radial front wheels. The driving-wheels have a total wheel-base of 17 ft. 5¾ in., and of this length 9 ft. 4½ in. alone is rigid, and that only at four points of rail contact—for the second driving-axle has a lateral play of $^{11}/_{16}$ in. on either side.

The rear connected axle is hollow and swivels freely on a ball pivot, which is formed in the middle of the crank-shaft, which is loosely contained in the hollow axle to allow universal movement of the driving axle. The wheel-centers and the hollow axle are a one-piece steel casting, and the pivot is held in a bronze bearing. Both the crank-shaft and the hollow axle rotate together by means of a central pin passing through the pivot ball. A direct lateral play of about ⅝ in. is, in addition, allowed to the bronze pivot bearing on either side; and this side movement is controlled by helical springs inside the hollow axle. The longitudinal displacements of the hollow axle are, in this case, the inverse of those of the tender: the one turning to the right when the other turns to the left, inversion being effected by means of a simple connection of oblique rods. The usual plan followed for 8-connected or 12-connected locomotives built for short-radius curves, is to connect the foremost and trailing hollow connected driving axles by means of longitudinal link-bars attached, at their mid lengths, to short vertical levers fulcrumed on the main frames, so that the axles are always simultaneously deflected in opposite directions. The section here given shows the hollow-axle collars by which the link-bars are attached to the axle.

The shortest radius of curves to be traversed by this engine is 450 ft., while other curves of 910 ft. radius are numerous. The driving wheels have a diameter of 48⅞ in. and the leading radial wheels of 41⅛ in. The distribution of the weights (engine loaded) is as follows:

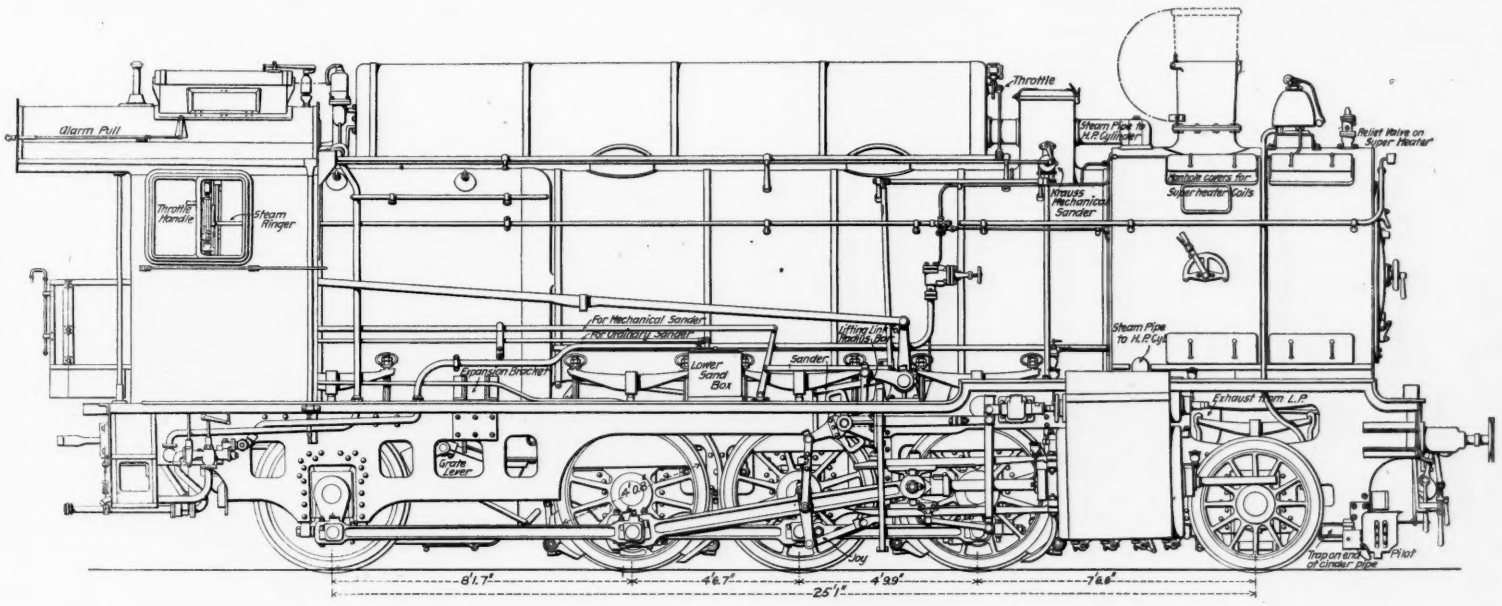
Leading wheels (radial)	22,880 lbs.
First drivers (rigid)	33,880 "
Second drivers (lateral play)	34,100 "
Third drivers (drivers)	34,320 "
Fourth drivers (pivotal)	34,100 "
Total	159,280 lbs.

The weight available for adhesion is 136,400 lbs. The maximum tractive effort is 23,188 lbs., the co-efficient of adhesion being scarcely 1:5.9, but this low figure can at all times be diminished to the limits of adhesion when the two cylinders are at work, and the tractive effort is increased by the auxiliary steam entering the mid-length of the cylinders. The engine, empty, weighs 141,790 lbs.

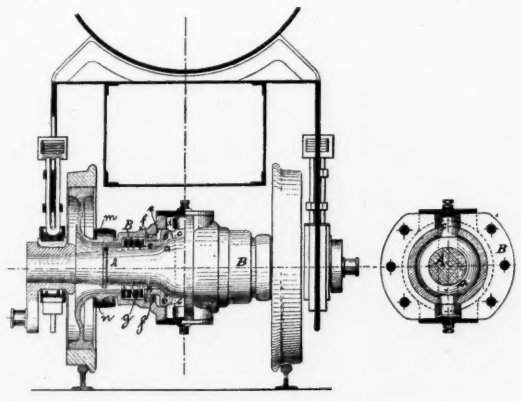
The constructive details to note in the boiler, besides those previously referred to, comprise a narrow welded ring at the front end, carrying the smoke-box flue plate, so that during repairs for corrosion it is not necessary to scrap a long boiler ring. The fire-box is copper and square in form, with straight sides, and the outside shell has a flat crown. The system of staying is particularly strong for the flat-surfaces. All the copper screw stays are bored from end to end, and the boiler covering is perforated opposite to each stay to indicate the point of any rupture. The boiler and reservoir are covered with cakes of asbestos.

The fire-door is the automatic Marck pivoted air-door which diminishes smoke during firing and saves coal. The inclined grate has an area of 32.8 sq. ft. and has a dropping section. The interior heating-surfaces of the boiler contain 1,941 sq. ft., of which 129.1 sq. ft. are in the fire-box. The boiler is supplied with three Friedmann injectors; lubrication of the cylinders and valves is effected by four Michalk oil-pumps, and there is the usual hand arrangement for sanding the third pair of drivers from a sand box on the frames, while the leading drivers are sanded from a boiler sand box fitted with the Krauss mechanical feeder operated from a part of the valve-gear, when the latter is giving a long steam admission. The throttle, in the front of the long steam barrel, is worked from an articulated low-reach throttle handle.

These engines, of which a number are now in course of construction, are to be used in freight and mixed and heavy passenger services. On the level they are in maximum speeds of 40 miles per hour, and 9 to 20 miles per hour with freight trains. They will be thoroughly tested as to the value of the superheater on certain engines with and on other engines without this appliance. At present they have shown an economy in water consumption of 10 per cent.



Consolidation Locomotive with Superheater—Saxony State Railways.



Hollow Axle and Crank Shaft of Rear Drivers—Saxon Locomotive.

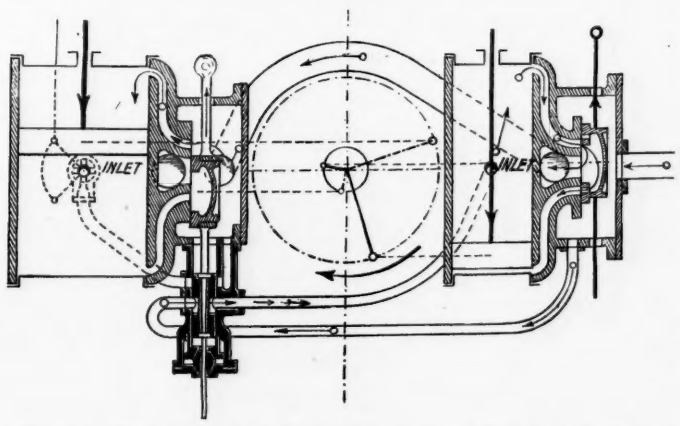
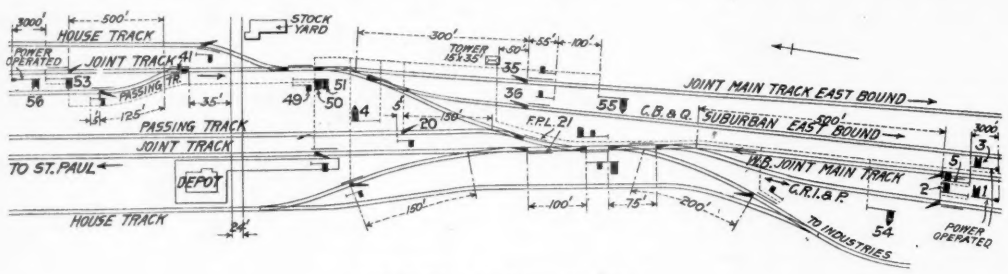


Diagram Showing Starting Mechanism of Saxon Superheated Steam Locomotive.

Double Track from St. Paul to St. Croix.

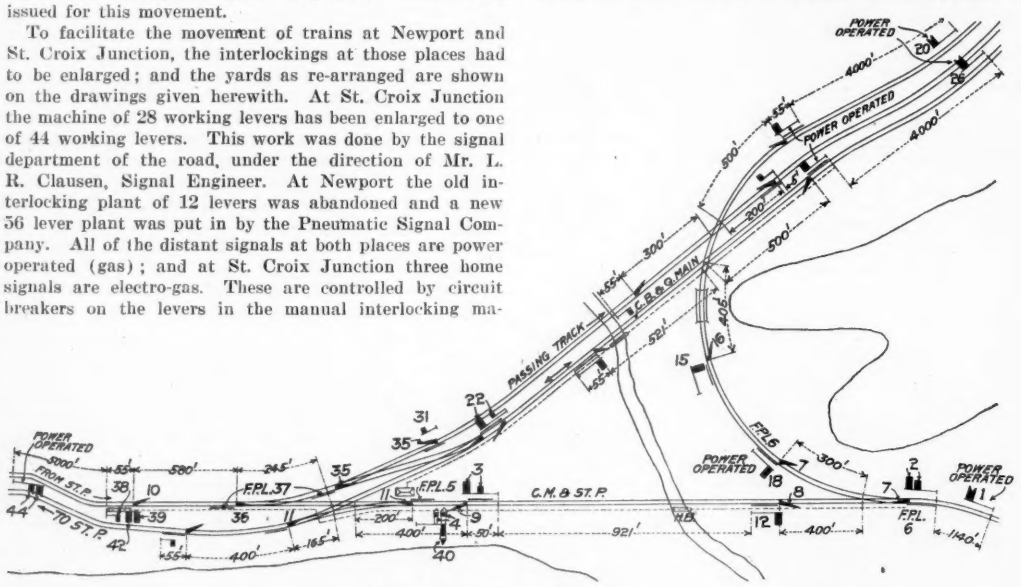
The Chicago, Milwaukee & St. Paul and the Chicago, Burlington & Quincy now use their respective single track lines between St. Paul and St. Croix Junction, Minn., as a double track railroad, thus doing away with a grade crossing at Newport and enabling westbound St. Paul trains to avoid a steep ascending grade west of St. Croix Junction. The situation of the lines is roughly shown in the accompanying sketch. Newport is eight miles southeast of St. Paul and St. Croix junction is about 12 miles farther, making the double track road about 20 miles long. The line is worked by the block system, a despatcher at St. Croix Junction controlling each signal operation at each block station. This procedure is similar to that in use on the Erie lines west of Salamanca. The trains run "left-handed," as will be seen by the short arrows in the diagram. The eastbound trains run on the Burlington to Newport and on the St. Paul road the rest of the way; westbound on the Burlington to Newport and the St. Paul the rest of the way. Between St. Paul and Newport the trains of the Chicago, Rock Island & Pacific also use these lines.



Interlocking at Newport, Minn.

The town of Langdon is so far from the Burlington road that the St. Paul company, to provide for its traffic, runs one passenger train daily from St. Croix Junction to Newport against the current of traffic, on the right hand track, a regular despatcher's order being issued for this movement.

To facilitate the movement of trains at Newport and St. Croix Junction, the interlockings at those places had to be enlarged; and the yards as re-arranged are shown on the drawings given herewith. At St. Croix Junction the machine of 28 working levers has been enlarged to one of 44 working levers. This work was done by the signal department of the road, under the direction of Mr. L. R. Clausen, Signal Engineer. At Newport the old interlocking plant of 12 levers was abandoned and a new 56 lever plant was put in by the Pneumatic Signal Company. All of the distant signals at both places are power operated (gas); and at St. Croix Junction three home signals are electro-gas. These are controlled by circuit breakers on the levers in the manual interlocking machine. The wires from the cabin to the signals have circuit breakers on the derails, preventing the wrongful clearing of the signal; and the rod which works the derail is bolt-locked in the operating case of the gas signal, so that the derail cannot be opened unless the signal is in the stop position.



Interlocking at St. Croix, Minn.

In the St. Croix plant there are eight Wharton derails, Nos. 7, 8, 10, 13, 16, 24, 28 and 29. The derails which are electrically locked are 6, 16, 23, 33 and 37.

In the St. Croix machine 22 levers work 26 signals; 11 levers work 11 derails; two levers work two derails and two switches; three levers work four switches and four levers work seven facing point locks.

At Newport there is one lever for each signal, one for each derail and one for each switch; but the nine facing point locks are worked by five levers.

The block sections on the eastbound track, beginning at St. Paul, are Lower Yard (0.4 miles); Oakland (3.3 miles); Newport (8.0 miles); Langdon (13.4 miles); St. Croix (18.4 miles). On the westbound track, beginning at St. Croix, the block sections are Curry (5.0 miles); Pullman avenue (9.8 miles); Newport (11.9 miles); Oakland (16.6 miles); Lower Yard (19.5 miles); St. Paul (19.9 miles). It will be seen that the longest block sections are about five miles in length. Between St. Paul and Newport the average number of passenger trains each way daily is 15, and of freight trains 20; east of Newport seven passenger and 17 freight each way.

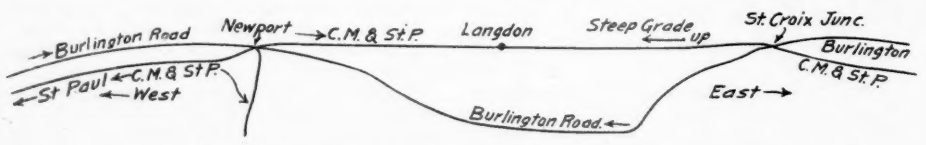
The movements of trains are controlled by a despatcher, as before stated, but they are under two different superintendents. The westbound track is under the charge of the Burlington superintendent and the eastbound under the Chicago, Milwaukee & St. Paul superintendent. This double track arrangement went into effect on December 6.

Foreign Railroad Notes.

The telegram from London concerning a French concession in China from the north line of French Tong-King northwest through the treaty town (market open to foreign trade) Meng-tze to Yunnan, describes only an old project, mapped as early as 1899. The importance of the province of Yunnan has apparently been greatly exaggerated. It was almost depopulated in a rebellion some 50 years ago, and is still much more thinly peopled than most parts of China; and the mines, of which wonderful tales were told, are said to be much less valuable than was at first supposed. The competition for its trade has caused it to be much talked about, however. It has no good river outlet, and a very considerable traffic has been carried by pack animals westward over the mountains to the railroads in British Burmah, which may be diverted by a railroad to Tong-King. The length of the proposed line to the city of Yunnan will be perhaps 175 miles, up a valley. The British projects for extensions of the Burmese lines into Yunnan require building over a number of parallel ranges of mountains on the border, and seem not to be seriously contemplated by the British authorities at present.

The railroad around the south end of Lake Baikal, which is to take the place of the car ferry, will be 160 miles long, while the ferry is but 47 miles long. The train will probably require 10 hours for the journey; the ferry, when the lake is open, only four; but the lake is not always open. The railroad is now open for freight for 33 miles and is to be completed by the beginning of 1905. Its estimated cost is $18,000,000, or $112,500 per mile. It is by far the most difficult section of the Siberian Railroad.

The Gotthard Railroad in 1902 earned $22,898 gross per mile, which was 3 per cent. more than in 1903. It is 172 miles long. The earnings per train mile were $1.93. The average receipts per passenger mile were 1.92 cents: per ton mile 2.03 cents. The working expenses were 58¼ per cent. of the earnings, leaving net $9,692 per mile, or 80½ cents per train-mile. The traffic was equivalent to the movement of 651 passengers and 818 tons of freight each way daily. The train movement averaged 16¼ trains each way daily. The number of employees was 20 per mile. The road with its great tunnel has cost about $59,000,000, of which $23,750,000 was subscribed by three nations. On this sum no interest is paid as yet. The share capital, about $10,000,000, received dividends of 6.8 per cent. both in 1901 and 1902.



A Double Track Railroad with Two Owners.

TECHNICAL.

Manufacturing and Business.

Jay G. Robinson has taken a position with the Latrobe Steel & Coupler Company, Old Colony Building, Chicago.

The Columbus Iron & Steel Company, Columbus, Ohio, has increased its capital stock from $750,000 to $1,000,000.

The Guanajuala Co. has been incorporated in New Jersey with a capital stock of $1,200,000. The incorporators are L. B. Dailey and others.

The J. M. Grossius Furnace Company, of Cincinnati, Ohio, has been incorporated, with a capital of $50,000. V. H. Grossius, W. J. Foy and others are incorporators.

The Harrell Stamp Mill Company, of El Paso, Texas, has been incorporated, with a capital of $50,000, to make mining machinery, including stamp mills, crushers, etc. The company is in the market for steel and electrical machinery. J. J. Harrell is President.

The Sterling Engine Company, Buffalo, N. Y., has been incorporated with a capital of $12,500, to make gas engines, by Albert B. Schultz, Adam Shabtar and Louisa H. Roosch, incorporators.

The gross earnings of the Alabama Consolidated Coal & Iron Company for the year 1903 was $3,182,668, as compared with $2,873,216 for the year 1902. The total surplus for the present year is $691,275.

The Mexican Car & Foundry Company, of Mexico City, it is reported, will shortly award contracts for the equipment of its car shops to be built in Mexico City, which are to have a capacity of 25 cars a day.

The Gibson Iron Works of Jersey City has been incorporated in New Jersey, to make boilers and machinery, with a capital of $60,000. Edward Gibson, Wm. W. Gibson and Ralph Conrad are the incorporators.

Frank H. Clark, of Evanston, Ill., formerly paymaster in the United States Navy, and since 1890 an official of the General Electric Company and the Westinghouse Electric Company, at Washington, D. C., died in Chicago on Dec. 5.

The Atlanta Equipment Company, of Schenectady, N. Y., has been incorporated with a capital of $25,000, to handle railroad equipment and machinery. The incorporators and directors are Leigh Best, Charles Denny and Charles E. Patterson, all of New York City.

The New England Railway Supply Company, of Guthrie, Okla. T., and Chicago, Ill., has been incorporated in Oklahoma, with a capital of $10,000,000, to make and sell Bett's safety railroad spike. The incorporators are John S. Betts and Chas. J. Betts, of Chicago, and G. B. Patterson, of Guthrie.

The Michigan Lubricator Company, of Detroit, Mich., has sent, through the agents of the Galena Oil Company, 25 new type improved Michigan triple locomotive lubricators, with safety device, to the Chilian Government R. R., and has also supplied the same article for the 150 new locomotives of the Erie R. R.

The Otto Gas Engine Works has decided to increase the capital of the corporation from $600,000 to $2,500,000, and to build a new plant for making gas engines, producer gas plants, launches and other adaptations of the gas engine. The company is looking for a site of thirty acres on a good water front with good railroad facilities.

David J. Evans, for a long time with the Lorain Steel Company, and its predecessor, the Johnson Company, has severed his connection with the Chicago office. He has also resigned his position of Secretary-Treasurer of the Northern American Railway Construction Co., and has taken an office at 1564 Monadnock Bldg., Chicago, where he will deal in railroad supplies, iron and steel.

Iron and Steel.

The Lackawanna Steel Company, it is reported, has an additional order for 6,600 tons of rails, from the Atchison, Topeka & Santa Fe.

The National Rolling Mills of the United States Steel Corporation at McKeesport, has resumed operations, giving employment to about 8,000 men.

Preparations are being made at the Duquesne plant of the Carnegie Steel Company to resume work at its 14 open-hearth furnaces. With this resumption every mill in the plant will be in operation.

Tennessee Central Shops Burned.

The Tennessee Central railroad shops in South Nashville, Tenn., were burned Dec. 31, causing a total loss of $320,000. The boiler shops, planing mill, blacksmith shop, roundhouse, machine shops, store room, and office were consumed, and four locomotives, one combination, and four box cars were destroyed.

Foreign Signaling Notes.

Tyer's tablet apparatus has been ordered for the equipment of a long section of the railroad of the Central South African Railway. The same apparatus is already in use on the Cape of Good Hope Government railroads. Tyer's tablet is a controlled manual block system, work-

ing on the same general principle as the electric train staff.

The London & Southwestern is to extend the use of automatic block signals, having given an order to the British Pneumatic Signal Company to equip its line between Woking and Fleet. The Northern of France is also to use the British Pneumatic Company's apparatus.

In Italy during the past three years the length of railroad worked under the block system has increased 55 per cent. An Italian railroad officer writes to the *Bulletin* of the International Railway Congress to state this fact, because in a former issue the *Bulletin* had called attention to the small amount of block signaling in use in that country. The 155 per cent. is not an imposing figure, however, for it represents only 135 miles.

United States Steel Corporation.

At the recent annual meeting this corporation decided to pay no dividend on the common stock. On the preferred stock the regular quarterly dividend was declared, to be paid February 15. According to the preliminary annual report net earnings fell from a total of $32,302,821 in the September quarter to $14,845,042 for the quarter ending December 31. In July the net earnings were $12,384,647, and in December only $3,100,000. The following comparative statement shows the net earnings for the quarter ended December 31 (December estimated):

1903.	1902.	
$14,845,042	$31,985,760	Decrease, $17,140,718

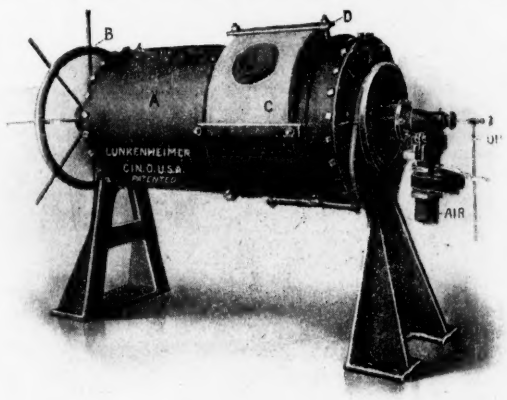
The net earnings for the year 1903 compare as follows with those of 1902:

1903.	1902.	
$108,979,012	$133,308,763	Decrease, $24,329,751

The net earnings of $108,979,012 for 1903 left a surplus of $11,962,645 after the fixed charges, depreciation, improvement and other charges, including the preferred and common dividends, were deducted. A deduction of $5,750,000 was made for depreciation in inventory valuations and for adjustment of sundry accounts. The decline in steel and iron prices was the cause of the reduction in inventory valuations.

A New Type of Metal Melting Furnace.

The accompanying illustration shows a type of metal melting furnace which has been found to be very efficient and economical in melting all kinds of metals in small quantities, particularly brasses and bronzes. It has been evolved after careful experiment and study and consists of a cylindrical sheet-steel drum A, having cast iron heads. The interior of the drum is lined with fireproof tile and there are two openings on opposite sides of the drum; only one of these openings is used, the other being closed by a fire clay filling. The object of having two openings is to increase the life of the lining of the furnace, since it has been found that the furnace wears out more quickly around the filling hole, which also serves as an outlet for the flame, than in other parts of the furnace. By having two filling holes, when one is worn out it can be closed by a fire clay plug and plate, the furnace reversed, and the other hole cut out and put in service. The oil burner is of a special type designed to



give the greatest amount of heat with the smallest consumption of oil. Six or seven heats per working day of ten hours can be obtained from one of these furnaces. The weight of each heat for the No. 1 size will average about 550 lbs., and the oil consumption varies from two to 2½ gallons of crude oil per 100 lbs. of metal melted. The life of the linings is from 300 to 400 heats, this varying with the kind of metal melted. The whole furnace is of a heavy and substantial construction and very durable. A simple form of lining tile is used which makes it easy to re-line the furnace. These furnaces are made in two sizes, the No. 1 size having a capacity of 550 lbs. of metal per heat, and the No. 2 size having a capacity of 1,200 lbs. of metal per heat. They are made by the Lunkenheimer Company, Cincinnati, Ohio.

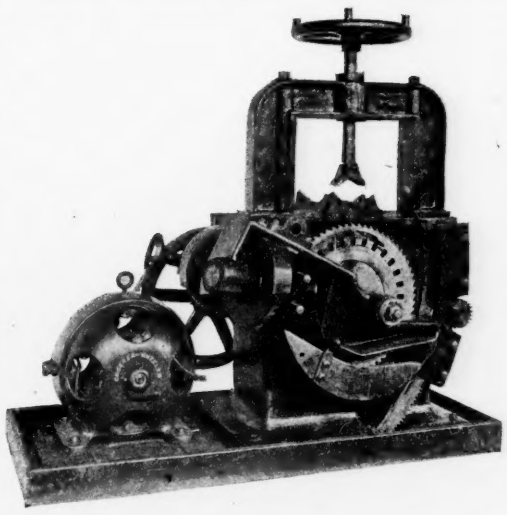
Indicator Signals in England and Belgium.

In the *Bulletin* of the International Railway Congress for December, Mr. Weissenbruch, the editor, describes a route signal which he has lately observed on the London & South Western, in which the indicator is very large. The signal was designed by Mr. Annett, signal superintendent of the road, and is spoken of as a novelty, though in principle it appears to be not radically different from the indicator signals which have long been in use in this country; a single arm is cleared for a movement over any one of a number of different diverging routes and the number of the route is indicated by a metal figure thrown up in front of a white background. At night the background, translucent, is illuminated. In the signal shown the single semaphore arm appears above a large rectangular box, or frame, about 4 ft. wide and 6 ft. high. This box is supported on a lattice mast of ordinary height, and is near the top of the mast; and in its front the indicating figure shows. The figure appears to be 20 or 30 inches high. It is of sheet metal on a wire screen. When the signal indicates stop all the figures are pulled up out of sight in the upper part of the box.

Mr. Weissenbruch says that indicators have been tried in Belgium, on the state railroads, but that, as the maintenance and inspection were not efficient, leaving wires often poorly adjusted, enginemen were sometimes in doubt about the reading of the number. With rod connections, or with electrically controlled signals, this difficulty would not exist, and the Belgian state railroads are going to extend the use of indicator signals.

Higley Cold Metal Saw.

The No. 14 Higley cold metal saw shown in the illustration is designed for rapidly and economically cutting off bar stock to given lengths. The supporting frame of the saw is swiveled about the sprocket shaft as an axis and the saw is fed up under the work with a powerful friction feed which is adjustable. The height under the arch of the clamp is 12 in. and the distance between the uprights of the clamp is 16 in., so that the tool can take



round stock up to 7 in. in diameter and I-beams up to 12 in. The machine is driven by a Crocker-Wheeler, 3-h.p. motor through a Renold silent chain and sprocket on the shaft, which is geared to the saw. The gearing on the saw consists of a spur gear and a bevel gear which drives a sprocket wheel, the teeth of which engage in perforations in the saw disk, thus applying the power very near the saw teeth. The motor runs at 725 r.p.m. on 120 volts, and at this speed the saw, which is 18 in. in diameter, makes about 4½ r.p.m. When once started the machine is automatic in its operation and needs no further attention until the cut is finished. It is sold by J. R. Vandyck Co., New York.

Electric Traction on the Boston & Albany.

A trolley line has been strung on the Newton Lower Falls Branch from Riverside on the main line 11 miles from Boston to Newton Lower Falls passenger station, a distance of about 7,000 ft. Only one car is run over this branch and a car is being made in the company's shops for this purpose. It will be a combination coach, containing passenger, smoking and baggage compartments; will be electrically lighted and heated and will be equipped with two G. E., 66 motors with type M controller, using, of course, overhead trolley. The trolley wire is a ⅜ grooved trolley hung with mechanical ears to brace brackets on chestnut poles, except at a few points where span wires are used over two or more tracks.

The bringing of the 550-volt, return track circuit into track No. 4 of the main line at Riverside station involves some rather perplexing signal questions, as it will be necessary to prevent interference between this current and the existing signal track circuits, fed by the ordinary gravity batteries. It is expected to overcome this difficulty by using a special form of polarized relay. The track on the branch is laid with second hand 4½-in., 72-lb. rail, on which the construction of the angle bars will not permit of the protecting bond, so that instead, two ⅜ strand cable bonds at each joint are used, applied outside the angle bar. These bonds have not been applied to date, nor feeder connections made. This being only a short line, it was not economical to put in a power plant, so for the present power for this purpose will be taken from the Newton & Boston Street Ry.

THE SCRAP HEAP.

Notes.

Near Morgan City, La., one day last week, two freight train men were fatally shot in a battle with negro tramps, who tried to rob the train.

According to the *Express-Gazette* 13 trains were "held up" in 1903 and 22 in 1902. The number of stage robberies in 1903 was six, one less than in the preceding year.

The Atchison, Topeka & Santa Fe is providing an entirely new set of coupon tickets at all its coupon stations, and it is said the number of forms will be reduced from 1,800 to 900.

On January 18 there will be advances in freight rates on many commodities from eastern points to the Pacific Coast. One newspaper figures out that the increase will average 17½ per cent. Included in the list are machinery, boots and shoes, stoves, agricultural implements and canned corn.

Isaac Gravelle, convicted of sending threatening letters to the Northern Pacific, has been sentenced, at Helena, Montana, to ten years in the penitentiary, and to pay a fine of $5,000. This appears to be the sequel to the dynamiting of trains which was reported on the Northern Pacific a few weeks ago.

On the Louisville & Nashville an order has been issued to change the lights on switches of tracks in large yards other than those on main tracks. Hitherto all of the switch lights on this road have shown red for stop and white for go ahead: but now those not connected with the main track will show red for stop and green for go ahead.

The Delaware & Hudson has notified its employees that the issuance of passes to employees and their families has become so extensive as to be burdensome; that some employees have been much favored while others have been denied; and that, therefore, the company will hereafter sell to employees, for themselves and their families, 500 mile books at half a cent a mile.

The Supreme Court of the United States has affirmed the constitutionality of a tax imposed by New York State on the cabs of the Pennsylvania R. R. in New York City. It appears that the railroad company resisted payment of the tax on the ground that the cab service was a part of the railroad transportation, and, therefore, was interstate commerce, and not subject to State taxation.

It is announced from Ottawa that the appointment of a Chairman of the Railway Commission will soon be made by the Governor General. An abstract of the law under which this commission is to be established was given in the *Railroad Gazette* of December 18, page 902. It is said that the Chairman is to be the Hon. A. G. Blair, who is a member of Parliament for St. John, New Brunswick, and who has been Minister of Railways and Canals.

A. L. Bowsher, a locomotive engineer of the Southern Pacific in California, received a Christmas present of a gold medal from passengers who were on train No. 16 on the night of October 31, when Bowsher, who was running the train, stopped his engine on a burning bridge in order to save the cars. The fireman jumped off and, with the tender and express car, fell to the Sacramento River, many feet below the track, and Bowsher braved great dangers of both fire and water to rescue him.

In the official freight classification of the Trunk Lines which went into effect on the first of January, there is a rule that agents at delivering points shall not in any way act as the representative of the consignor or consignee for the distribution of carload shipments. Under another rule the railroads reserve the right to decline shipments of insecure packages. To the rule relating to stoves in cars in which perishable freight is shipped in freezing weather has been added a note requiring all stoves to be fastened and securely braced, stovepipes to be fastened clear of woodwork, with a metal collar at openings, the woodwork to be protected with sheet metal, and coal, coke, or charcoal to be used as fuel.

The Guatemala Central.

The Mazatenango extension of the Guatemala Central Railroad has been completed. Connection is made with the Occidental Railroad at Mazatenango. The extension is 27 miles long. The line runs through Patulul, Guatalon, Nahualate, Palo Gordo and Mazatenango, and the principal traffic will be coffee, sugar and cereals. C. Gray, Guatemala City, is the Chief Engineer.

No Favors for Daubers.

The Interstate Commerce Commission, in an opinion by Commissioner Clements, has announced the decision in the case of the Dorr Manufacturing Company of Baltimore, against the Pennsylvania Railroad and others in favor of the defendants. The Commission holds that while there are exceptional instances requiring deviation from methods generally employed in making freight classification, it is manifest that to require the separation and grading into different classes with varying rates different grades of the same articles of freight would greatly complicate the work and go far to defeat the very purpose of classification, and even then it would be impracticable to apportion with mathematical exactness the burdens of transportation; the best result obtainable in this direction is reasonable and substantial approximation. A cheap grade of brush manufactured and sold by complainant as a blacking dauber is not entitled, upon the facts in this case, to be classified lower than the class to which bristle brushes in general are assigned.

Changes on the Seaboard Air Line.

The Raleigh, N. C., *Times* finds proper reason for admonishing the communities served by the Seaboard Air Line that the vigorous reformation instituted by Major F. K. Huger, the General Superintendent, is for the public good. "Railroad people are as far from doing spite work as any class of men to be found. The best interest of their own business would not allow this, even if they desired to pursue such a course. The railroads need and

want every first class man in the service, and when a man loses his place it is safe for him and his friends to understand there is some good reason for it. Competent, unobjectionable men are a scarce commodity, and instead of such men losing their jobs, they are being looked for, not only by railroads, but by men in every department of business. The fact that a man loses a position does not necessarily reflect upon him. Some men who are honest, industrious and conscientious in the discharge of their duty, yet are not prepared to continue in their positions and for reasons satisfactory to their employers they are removed. In such cases the public does not know, and is not entitled to know, all of the inside facts, and a newspaper that interferes in matters of this sort is clearly, in our judgment, out of its sphere of legitimate work. We call to mind some years ago, when several employees of a certain railroad lost their positions under rather unusual circumstances. A great hue and cry was raised by the newspapers, protests and even threats of boycotting the road were freely indulged in by the friends of the men who had lost their places. But when the facts became known the railroad officials were fully sustained, even by those who had been positive in their criticisms. It will turn out this way nine times out of ten. Nobody loses his position who is meeting all the demands of the situation."

Record Output of Baldwin Locomotives.

The output of the Baldwin Locomotive Works for 1903 was the largest in the history of that establishment. It comprised a total of 2,022 complete locomotives. In addition to these, duplicate or repair parts were furnished equivalent to about 250 complete locomotives additional. Of the completed locomotives 1,966 were for service in the United States and 56 for use in China, Costa Rica, Cuba, Mexico, Japan, Newfoundland, Yucatan, England, Hawaii, Brazil, British Columbia, Nicaragua, Peru, and Porto Rico. Compound cylinders were applied to 300 locomotives, while 85 locomotives were operated by electricity and six by air. This output represents the united efforts of a weekly average of 14,720 men working 10 hours per day, some on day turn and some on night turn. The product of the nine preceding years was as follows:

1894	313	1899	901
1895	401	1900	1,217
1896	547	1901	1,375
1897	501	1902	1,533
1898	752		

American Brakes in Russia.

The story of the equipment of the Russian railroads with American air-brakes has been told, but a present incident makes it repeatable. A serious accident occurred on one of the State railroads in 1895, when a hand-braked train ran into and telescoped a train that was standing on the track ahead of it, killing several persons. At that time the Government Railroad Department had equipped only passenger trains with the air-brake. In course of the inquiry that followed this disaster, the Emperor asked the Minister of Ways and Communications to explain how it had happened. That official said that if the freight cars also had been equipped with American automatic air-brakes, the accident would not have occurred. To this the Emperor replied: "Why were they not so equipped?" Such a reply being equivalent to a command, all troubles in the way of lack of funds speedily vanished, and a commission was formed from the Ministry of Ways and Communications to investigate and recommend the best automatic air-brake. This Commission tested the brake of five companies who were competing for the five-year contract for $7,000,000 worth of brakes which the Government needed at that time. As a result, the Westinghouse air-brake was chosen. The Government contract stipulated that the brakes should be made in Russia, and a Westinghouse factory was at once started at St. Petersburg. From the day that the report of the Commission was accepted until now the Westinghouse Company has supplied all the brakes for the Russian Government. An order for 1,000 sets of Westinghouse locomotive brakes has just been given. The policy of the Russian Government demands that all material which is to be used in connection with Government contracts must be made in Russia by a Russian company. The Westinghouse is the only Rusian brake company in existence; none other has received a charter.

St. John's Orphanage.

According to a Philadelphia paper, the orphanage known by the above name, at Philadelphia, which is maintained by a fund left by J. Edgar Thomson, is to be enlarged, the death of Mrs. Thomson recently having made available a largely increased fund. This orphanage, which is on Rittenhouse street below 18th street, Philadelphia, was started in 1882 by Mrs. Thomson. The enterprise was due to this lady's hearty sympathy with the objects of her husband's will and her desire to promote his purpose; for there was no mandatory provision requiring the establishment of the institution before her death.

To most of the readers of the *Railroad Gazette*, who will recall Mr. Thomson's name as that of the great President of the Pennsylvania Railroad from 1852 to 1874, it will be a surprise to learn that in his early life he was Chief Engineer of the Georgia Railroad (the first long railroad in America), and that his will makes orphans of employees of the Georgia Railroad preferred beneficiaries. The principal clause in the will concerning the orphanage is as follows:

The net income of the estate or so much of it as may be judiciously applied thereto is to be used for the education and maintenance of female orphans of railroad employees whose fathers have been killed while in the discharge of their duties, preference being given as follows:

First. To the orphans of employees engaged upon the Pennsylvania Railroad.

Second.—To those of the Georgia Railroad, between Augusta and Atlanta, Ga.

Third.—To those of the lines controlled by the Pennsylvania Railroad Company by lease or otherwise.

Fourth.—To those of the employees of any other railroad company in the United States of America.

The trustees under the will are William M. Spackman, Henry E. Smith, Christiana B. Smith, W. A. Patton, M. Riebenack and W. Heyward Myers. The valuation of the estate has not as yet been ascertained, but it is anticipated that the income therefrom will probably provide in the near future for the maintenance of an institution to accommodate and educate between 60 and 80 orphans.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular mettings of railroad associations and engineering societies see advertising page 16.)

American Association of Dining Car Superintendents.

At the next meeting of this Association, to be held at the Sherman House in Chicago, Jan. 20, it is expected that sessions will be held on three or four days. A visit has been arranged to the stock yards and to the exhibit of the "Chefs" of Chicago at the Coliseum, Jan. 21. The members also expect to visit various catering establishments to see novelties.

Canadian Society of Civil Engineers.

At the annual meeting of this Society, to be held in Montreal on Tuesday, Jan. 26, there will be an illustrated descriptive paper on the Canadian Pacific's new shops at Montreal, by Henry Goldmark; also one on the Locomotive and Machine works at Longue Pointe, by M. J. Butler. On Wednesday a visit will be made to the works of the Locomotive & Machine Company, the Canadian Pacific shops, and the transformer station of the Shawinigan Water & Power Co., on the invitation of these companies. The Locomotive & Machine Co. will provide a luncheon for the party at its works. On Thursday reports will be read and there will be an address by the retiring President, Mr. K. W. Blackwell.

The Railway Signal Association.

Meetings of this Association will be held on Tuesday, January 12, as before announced, at the Great Northern Hotel, Chicago, and the Grand Union Hotel, New York, both beginning at 2 o'clock p.m. These meetings are chiefly for conferences of committees to consider the work that they have to do in the coming year; but also, at both meetings, the members will be asked to discuss the question of the best means of keeping interlocking plants working in satisfactory condition in severe snow storms.

A member proposes for discussion the question whether high semaphore signals should not at night be distinguished from less important signals, such as lights on switch stands, by having a double light. He proposes for high speed interlocked signals two red lights, side by side, for "stop"; two green lights for all clear, and a red and a green for caution, or a distant signal for train order signals he would have a single red light—stop for train order; a single green—go ahead, no train order.

A proposition will be offered to amend the By-Laws of the Association so that meetings shall be held on the second Tuesday of the months of March and October (or November) and may be held, at the discretion of the Executive Committee, on the second Tuesday of January and May.

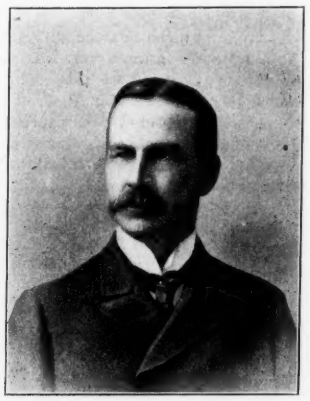
The chairmen of the committees for 1904 are as follows: Circuits; Automatic Block Signal Systems for Steam and Electric Railroads, L. R. Clausen, Chicago, Milwaukee & St. Paul. Circuits; Manual Block Signal Systems, C. H. Morrison, Erie Railroad. Circuits for Interlocked Signals, A. H. Rudd, Pennsylvania. Circuits; Special, Including Draw Bridges, Lawrence Griffith, Grand Central Station, New York. Organization, E. B. Ashby, Lehigh Valley. Cost, On What Shall be Considered Cost in Estimates for Installation and Records of Maintenance, H. M. Sperry, Union Switch & Signal Co. Wire; Copper and Iron for Pole Lines, H. S. Balliett, Lehigh Valley. Standards, C. A. Christofferson, Chicago & Great Western. Definitions and Nomenclature, J. A. Peabody, Chicago & North Western. Office Records and Accounts, W. McC. Grafton, Pennsylvania Lines West of Pittsburg. Topics, C. C. Rosenberg, Lehigh Valley.

PERSONAL.

—Colonel William H. Owen, civil engineer in the quartermaster's department of the United States Army, died at his home in Washington on December 31. Col. Owen served in the army through the War of the Rebellion; and after the war he was engaged in construction work on the Northern Pacific Railroad.

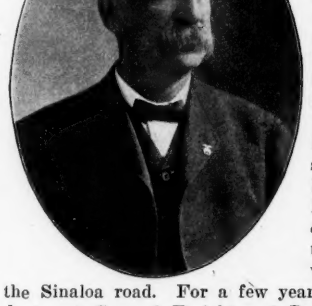
—Mr. T. J. Foley, the new General Superintendent of the Wheeling System of the Baltimore & Ohio, who goes to Wheeling from the Chicago Division of this company, was born at Convoy, Ohio, 38 years ago. His first position in railroad service was that of telegraph operator on the Pittsburg, Fort Wayne & Chicago. This was in 1878, and he remained here about two years. Then for the next 13 years he served as train despatcher between Fort Wayne and Chicago, and was successively, until 1896, chief train despatcher and assistant trainmaster. In that year (1896) he was made Transportation Inspector of the Pennsylvania Lines West of Pittsburg. Five years later he went to the Baltimore & Ohio at Baltimore as Assistant to the General Manager, and in April, last year, became Superintendent of the Chicago Division at Chicago, which office he now leaves to become General Superintendent of the new "system," which includes the Newark, Cleveland, Wheeling and Ohio River Divisions. Mr. Foley's office will be at Wheeling, W. Va.

—Mr. Theodore P. Shonts, who succeeds Mr. Benjamin Norton as President of the Toledo, St. Louis & Western, is a native of Pennsylvania. He was born in Crawford County, and was graduated from Monmouth College, in the class of '76, with the degree of B. A., and in 1879 the degree of M. A. was conferred upon him by that college. Mr. Shonts was for a number of years on the Indiana, Illinois & Iowa. His railroad service dates from 1881, when he began as Superintendent for the Iowa Construction Company. The next year he entered the service of the Indiana, Illinois & Iowa as General Superintendent. He was promoted to be General Manager in 1886, and in June, 1898, was elected President, from which position he resigned about one year ago.

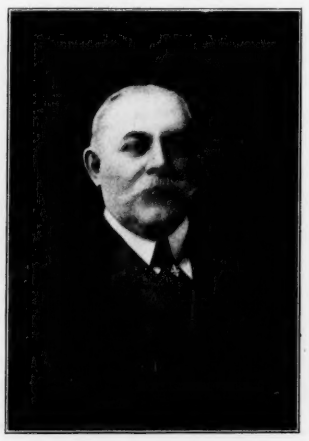


—General James Longstreet, the noted Confederate General, died Jan. 2. For the past six years General Longstreet has been Commissioner of the Pacific railroads, having been appointed to the office by President McKinley in 1897.

—Mr. H. M. Fickinger, whose promotion to the General Superintendency of the St. Louis & San Francisco Lines in Texas, at Fort Worth, has been announced, has been in railroad service for the past 34 years. He began in the fall of 1869 as a telegraph operator on the Cleveland & Erie (Lake Shore & Michigan Southern). For about 11 years, from 1871, he was chief despatcher of the Franklin and Youngstown Divisions of the L. S. & M. S., and for the two years following was Superintendent of the Sinaloa road. For a few years he was Superintendent and General Freight and Passenger Agent on the Kansas City, Pittsburg & Gulf, and for a number of years was traveling passenger agent on the Memphis Route. Later he became commercial agent of the Colorado & Southern at Colorado Springs, from which position he was promoted to the Superintendency at Memphis; and this position he now leaves to become General Superintendent at Fort Worth.



—Mr. Oscar G. Murray, who has been chosen President of the Baltimore & Ohio, to succeed Mr. Loree, has since 1896, been First Vice-President of this company. Mr. Murray started his railroad career on the Galveston, Houston & Henderson in 1872 as ticket agent at Galveston, Texas. Between that time and 1880 he served in various positions in the freight and passenger departments, finally becoming General Freight and Passenger Agent of the company. In August, 1880, he went to the Gulf, Colorado & Santa Fe as General Freight and Passenger Agent. In 1885 he went to the Missouri Pacific as Traffic Manager of that company's lines in Texas. At the same time he was Traffic Manager of the Texas & Pacific. For two years, from 1886, he was Freight Traffic Manager of all the Missouri Pacific Lines at St. Louis. In 1888 he went to the Cincinnati, Indianapolis, St. Louis & Chicago as Freight Traffic Manager, and rose to be Second Vice-President of this company's successor, the Cleveland, Cincinnati, Chicago & St. Louis. Mr. Murray resigned from this position in February, 1896, to become First Vice-President of the



Baltimore & Ohio, which office he has since held. During the three years, 1896-97-98, when this company was in the hands of the Receivers, Mr. Murray was one of the two joint Receivers.

—Mr. George W. Parsons, who for many years has been in charge of the Frog, Switch and Signal Department of the Pennsylvania Steel Company, has retired from active service. Mr. Parsons will, however, remain with the company in an advisory capacity. Mr. C. W. Reinoehl, who has been in charge of the Steelton sales office as Sales Agent, will succeed Mr. Parsons as Superintendent of the Frog, Switch and Signal Department, and Mr. Reinoehl will in turn be succeeded by Mr. W. C. Cuntz. These changes all took effect on January 1.

—Mr. Ethan A. Gilbert, the retiring Master Car Builder of the Southern Pacific, has entered the employ of the W. H. Miner Company of Chicago, dealer in railroad supplies, as its western representative. Mr. Gilbert is 41 years old and was born at Walpole, N. H. His railroad service dates from 1880, when he began as a car builder's apprentice on the Cheshire road. From 1883 to 1887 he was on the Boston & Albany, and in the latter year went to the Southern Pacific as car inspector. For about three years he was on the Boston & Maine as General Car Inspector, but in the spring of '93 returned to the Southern Pacific in a similar capacity. The next year he was appointed General Foreman of car shops at Ogden, Utah, and for three years, from 1895, was General Car Inspector. From this position he was promoted to be Assistant Master Car Repairer of the Western Division, and in February, 1900, went to Sacramento as Assistant Master Car Builder, from which position he was later promoted to that of Master Car Builder, which office he now leaves to go to Chicago.

—Mr. Randolph Brandt Latimer, who died at his home in Baltimore, December 24, at the age of 83, was in former years a well known civil engineer and was employed on the construction of the Baltimore & Ohio between Harper's Ferry and Cumberland. He was Resident Engineer in charge of the construction of the original Harper's Ferry bridge, the one which was destroyed early in the civil war. Mr. Latimer was born in Baltimore and was there educated as a civil engineer and commenced the practice of his profession on the Baltimore & Ohio. Here he was under the late Jonathan Knight, Chief Engineer, and was associated with Benjamin F. Latrobe and James L. Randolph. After the completion of the Baltimore & Ohio to Cumberland Mr. Latimer engaged in mercantile business at Patterson's Creek, Va., and never afterwards followed his profession. His business was soon moved to Baltimore and there he remained until his death, retiring from business in 1884. Mr. Latimer was the father of J. B. Latimer, Signal Engineer of the Chicago, Burlington & Quincy; also of Prof. R. R. Latimer, of the Maryland Institute, Baltimore.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—Joseph M. Graham, Chief Engineer at Baltimore, has resigned. (See Erie.)

Bath & Hammondsport.—See Erie.

Birmingham Belt.—F. O. Becker has been appointed General Manager, with headquarters at Birmingham, Ala., succeeding G. H. Clark, resigned.

Boston & Maine.—C. L. Aiken, Division Master Mechanic at Springfield, Mass., has been transferred to Lawrence, and is succeeded at Springfield by C. W. Hall.

Canadian Pacific.—George H. Webster has been appointed Division Engineer of the Pacific Division, with headquarters at Vancouver, B. C., succeeding F. F. Busteed, transferred, and Mr. Webster in turn is succeeded by Henry Irwin as Right of Way and Lease Agent, with headquarters at Montreal, effective Feb. 1.
J. W. Leonard, Assistant General Manager of the Western Lines, with office at Winnipeg, Man., has resigned.

Chicago & Alton.—H. F. Baldwin, Chief Engineer, has resigned, effective Jan. 15.

Chicago, Cincinnati & Louisville.—G. A. Clark has been appointed Car Accountant, with office at Peru, Ind. The offices of Superintendent of Motive Power, Superintendent and Train Despatchers have been removed from Richmond to Peru, Ind.

Chicago, Milwaukee & St. Paul.—P. C. Hart, hitherto Superintendent of Terminals at Kansas City, Mo., has been appointed Division Superintendent, with headquarters at Babcock, Wis., succeeding G. H. Atkins, resigned.

Chicago, Rock Island & Pacific.—J. O. Crockett, formerly Division Superintendent on the Vandalia Line, has been appointed Assistant to the General Manager of the C., R. I. & P.

Cleveland, Cincinnati, Chicago & St. Louis.—W. J. Thomas, Master Mechanic at Wabash, Ind., has resigned.

Crooked Creek.—A. K. Hamilton has been elected President, succeeding the late J. M. Funk.

Erie.—Joseph M. Graham, hitherto Chief Engineer of the Baltimore & Ohio, has been elected Fourth Vice-President of the Erie, with office at New York.
Since January 1, the traffic officers of this company have had jurisdiction over all traffic matters of the Bath & Hammondsport R. R.

Great Northern.—J. J. Dowling has been appointed Master Mechanic at Everett, Wash., succeeding T. J. Clark, resigned.
(See Spokane Falls & Northern.)

Jonesboro, Lake City & Eastern.—W. T. Lambert has been appointed Master Mechanic, with headquarters at Jonesboro, Ark.

Lehigh Valley.—Thomas N. Jarvis, hitherto General Freight Agent, has been appointed Freight Traffic Manager, with headquarters at New York. C. A. Blood succeeds Mr. Jarvis at New York, and H. C. Burnett succeeds Mr. Blood as Assistant General Freight Agent, with headquarters at New York. H. B. Crandall has been appointed Coal Freight Agent, succeeding George S. Taylor, assigned to other duties, and A. Hunter, having been assigned to other duties, the office of Through Freight Agent has been abolished. J. S. Wood has been appointed Division Freight Agent, with office at Buffalo, N. Y., succeeding H. C. Burnett, promoted.
H. B. Crandall has been appointed Fuel Agent, with office at New York.

Louisville & Nashville.—A. Beckert, Master Mechanic at Decatur, Ala., has resigned.

Minneapolis & St. Louis.—W. T. Noonan, Superintendent at Minneapolis, Minn., has resigned.

New York, New Haven & Hartford.—J. S. Scofield, Assistant Superintendent at New York, has resigned, and that position has been abolished.
The title of J. W. Wardrop, Superintendent of the Harlem River Freight Terminals, has been changed to Freight Agent. His former position has been abolished.

Seaboard Air Line.—John Skelton Williams, hitherto President, has been chosen Chairman of the Board, and J. M. Barr, hitherto First Vice-President and General Manager, has been elected President and General Manager. Other officers are: N. S. Meldrim, Vice-President and Treasurer; D. C. Porteous, Secretary, and T. W. Roby, Comptroller.

Southern.—C. S. McManus, hitherto General Superintendent of the Western District, with headquarters at Birmingham, Ala., has been appointed General Superintendent of the Eastern and Western Districts, with headquarters at Greensboro, N. C. S. J. Collins, hitherto General Superintendent of the Eastern District at Greensboro, has resigned. M. M. Richey, hitherto Superintendent of the Birmingham Division, has been appointed Assistant General Superintendent of the Western District, with headquarters at Birmingham, Ala. J. J. Cotter, Superintendent of the Mobile Division, has been appointed to succeed Mr. Richey at Birmingham, and F. J. Egan, hitherto Trainmaster at Macon, Ga., has been appointed to succeed Mr. Cotter at Selma, Ala.

Spokane Falls & Northern.—T. J. Clark, hitherto Master Mechanic of the Great Northern, has been appointed Master Mechanic of the S. F. & N., with headquarters at Spokane, Wash., succeeding C. H. Prescott, resigned.

Southern Pacific.—A. H. Babcock has been appointed Electrical Superintendent, with headquarters at San Francisco.

Union Pacific.—Horace G. Burt, President, has resigned.

Wabash.—S. E. Cotter, hitherto Division Superintendent at Peru, Ind., has been appointed Division Superintendent at Decatur, Ill., succeeding H. G. Clark, resigned.

CAR BUILDING.

The American Car & Foundry Company has miscellaneous orders for 270 cars.

The Pere Marquette is reported to have let an order for 1,000 cars to Haskell & Barker.

The St. Louis Refrigerator Car Co. has ordered 500 beer cars from the American Car & Foundry Co.

The Knickerbocker Ice Company, Chicago, Ill., has ordered 12 refrigerator cars from the Pullman Company.

The Delaware, Lackawanna & Western is reported to have recently placed an order for 10 passenger coaches.

The Five-Mile Beach Electric Railway has ordered two open motor car bodies, and one closed motor car body from the American Car & Foundry Co.

BRIDGE BUILDING.

BINGHAMTON, N. Y.—It is reported that bids are wanted Jan. 11, by the City Clerk, for $50,000 of bonds, for building a viaduct, and $57,000 of bonds for the Rock Bottom bridge.

BIRMINGHAM, ALA.—Bills have been introduced in the lower House of Congress and referred to the Committee on Interstate and Foreign Commerce, authorizing the Mobile & West Alabama R. R. Co. to build bridges over the Tombigbee River between Clarke and Choctaw Counties, Ala., and over the Warrior River in Tuscaloosa County, Ala.

CALAIS, ME.—A bridge may be built over the St. Croix River to connect the Washington County R. R. and the New Brunswick Southern road.

CROTON LAKE, N. Y.—Sealed proposals will be received by H. Fernstrom, Chief Engineer, New York Central & Hudson River Railroad, Grand Central Station, New York, Jan. 20, for the masonry for bridge P 43 over Croton Lake, N. Y., on the Putnam Division of the N. Y. C. & H. R. R. R.

FORT SNELLING, MINN.—A bill has been introduced in the House of Representatives authorizing the Secretary of War to strengthen, widen and improve the bridge over the Mississippi River, at Fort Snelling.

FULTON, ILL.—It is announced that the Chicago & North Western will build early in the spring a double track steel bridge over the Mississippi River at Fulton, to cost about $500,000.

GALVESTON, TEXAS.—The Santa Fe and Southern Pacific may jointly build a steel bridge over Galveston Bay, connecting Galveston Island with the mainland.

GRAYS POINT, MO.—The Committee of Commerce of the Senate recommends the passage of a bill extending the time for the completion of the bridge over the Mississippi River at Grays Point, Mo., for three years, to expire Jan. 26, 1907.

GROTON, CONN.—The contract, it is reported, has been awarded to the Berlin Construction Company for about $25,000, half of which is to be paid by the Groton & Stonington Street Ry. Co., and the balance by the towns of Groton and Stonington, for building the new drawbridge over the Mystic River, to replace the present structure.

HARRISBURG, PA.—A bill is before the Committee on Interstate and Foreign Commerce of the House of Representatives authorizing the Charleroi & Monessen Bridge Co. to build a bridge over the Monongahela River, in Pennsylvania.

HOT SPRINGS, ARK.—Bids are wanted Jan. 23, by S. A. Buchanan, County Clerk, for building a highway bridge 628 ft. long by 16 ft. wide, over the Ouachita River in Garland County.

HOUSTON, TEXAS.—The bids received Dec. 16 for building a steel bridge over Buffalo Bayou at McKee street have been rejected and new ones are asked Feb. 10. The city will contribute $22,500 towards the cost of this work. John W. Maxcey is Superintendent of Roads and Bridges.

KANSAS CITY, KAN.—Bids are wanted Feb. 1, by Frank Holcomb, for building a steel bridge over the Kansas River at the west end of Kansas avenue.
Bids will also be received on the same date for building a steel bridge over Kansas River at the southwest end of Argentine boulevard.

MARKED TREE, ARK.—A bill is before the House of Representatives authorizing Poinsett County, Ark., to build a bridge over St. Francis River, at or near Marked Tree, Ark.

MINNEAPOLIS, MINN.—A bill is before the United States Senate authorizing the Secretary of the Interior to authorize a bridge across Thief River, in Minnesota.
A bill has been introduced in the House of Representatives and referred to the Committee on Interstate and Foreign Commerce, declaring a portion of the Minnesota River in Minnesota not navigable and authorizing the building of bridges over it.

MONTGOMERY, ALA.—In the United States Senate a bill has been introduced and referred to the Committee on Commerce authorizing the Montgomery & Autauga Bridge Co. to build a bridge over the Alabama River, near Montgomery.

NEW YORK, N. Y.—The bids opened by the Bridge Department Dec. 30, for building three bridges over Gowanus Canal, at Ninth street, Third street and Union street, in the Borough of Brooklyn, were as follows: R. H. Hood Company, $204,717.50; Snare & Triest Company, $214,087.50; Walter Gahagan, $230,020.50, and Barth S. Cronin, $239,429. The contract was awarded to the R. H. Hood Company, of New York City.
The bids opened Dec. 30 by the Bridge Department for building a bascule bridge over Gowanus Canal at Hamilton avenue, in the Borough of Brooklyn, were as follows: R. H. Hood Company, $99,753.50; Bernard Rolf, $109,476.50; Snare & Triest Company, $113,421.40; Barth S. Cronin, $115,262.50; United Engineering & Contracting Company, $132,370, and Michael J. Dady, $141,876. The contract was awarded to the R. H. Hood Company, of New York City.

PALO PINTO, TEXAS.—Palo Pinto County has voted to issue $40,000 of bonds for building two bridges over the Brazos River.

PHILADELPHIA, PA.—The Mayor has signed the ordinance permitting the Reading Ry. to build a bridge over Delaware avenue at Noble street, for the purpose of elevating its freight tracks.

PORTLAND, ORE.—Bids are wanted in January by Wm. C. Elliott, City Engineer, for building a bridge over Balch Creek, on Thurman street, to cost about $32,500.

ROCHESTER, N. Y.—The supervisors committee recommends that the county build a bridge connecting Seneca Park, East and West, at a cost of about $200,000. John H. Ashton is chairman.

ST. LOUIS, MO.—An ordinance has been approved by the Board of Public Improvements for the building of a new footbridge over the railroad tracks at Ewing avenue, at a cost of $9,000; also for the re-construction of part of the Twenty-first street bridge.

SCRANTON, PA.—The Board of Public Works has decided to build at once a bridge over the Lackawanna River at Race street; also over Roaring Brook at Ash street.

SOUTH BEND, IND.—Contracts, it is reported, have been given to the Savage Construction Company of Chicago, Ill., for the substructure of the Colfax avenue bridge, for $23,924, and to the Lafayette Engineering Company of Lafayette, Ind., for the superstructure, for $59,200.

SYRACUSE, N. Y.—Plans, it is reported, are being made by the State Engineer for a hoist bridge to be built over the Oswego canal at Willow street, for which an appropriation of $19,000 has been made.

VERNON, N. Y.—The Oneida Railway Company may soon build a steel bridge over the Ontario & Western tracks.

WASHINGTON, D. C.—The District Commissioners, it is reported, will build the Anacostia bridge, at a cost of $250,000; also a bridge over Piney Branch on 16th street, to cost about $50,000. W. J. Douglas is District Commissioner of Bridges.

WESTPORT, MASS.—At a recent meeting of the bridge committee, an appropriation of $16,000 was voted to complete the building of the Point bridge at Westport.

Other Structures.

AUSTIN, TEXAS.—An officer of the Trinity & Brazos Valley writes us that this company will put up a number of buildings at a cost of from $3,000 to $25,000 each, along its line from Cleburne to Mexia. The contracts have been let.

CHARLOTTETOWN, P. E. I.—The Prince Edward Island Railway is calling for bids for building stations at Albany, Kinkora, Northam, Richmond.

CLARION, IOWA.—The Chicago Great Western, it is reported, will build a new station 96 ft. x 102 ft., on which work will soon be started.

EL PASO, TEXAS.—The eight railroads composing the Union Station Corporation decided at a recent meeting to issue bonds for $240,000, the estimated cost of the union station.

GLYNDON, MD.—The Western Maryland will rebuild its station, recently destroyed by fire, at a loss of about $12,000.

HICKORY, VA.—The Southern and the Carolina & Northwestern, it is reported, have agreed to comply with the corporation commission's recent order for the building of new and larger freight houses at Hickory.

HOUSTON, TEXAS.—The International & Great Northern, it is reported, has the land on which it will soon build its new freight houses, for which $100,000 has been set apart.

JOLIET, ILL.—The proposition of the several railroad companies to build a union station and put in subways in place of the general track elevation plans, has been rejected by the City Council.

KANSAS CITY, MO.—At the meeting to be held in Kansas City, Jan. 12, of the stockholders and directors of the Union Depot Company, it is expected that the railroads

will be unable to agree on the building of a single union station and that possibly two or more stations may be built.

LINCOLN, ILL.—The Illinois Central, it is reported, has plans ready for building a new passenger station, for which the contract will soon be awarded.

MT. MORRIS, N. Y.—The Delaware, Lackawanna & Western, reports say, has bought land on the Geneseo road on which it will build a new passenger station in the spring.

NEW CASTLE, PA.—The Baltimore & Ohio and the Pittsburg & Lake Erie may jointly build a new union passenger station in the spring.

PERU, IND.—It is reported that the Wabash is considering plans for the building of new stations at Peru, Logansport and Colburn.

STRATFORD, ONT.—The Grand Trunk shops, it is reported, will be enlarged early in the spring.

TOLEDO, OHIO.—The National Supply Company, it is reported, is building a forge shop 110 ft. x 110 ft., to cost about $10,000; a warehouse 100 ft. x 150 ft., to cost about $20,000, and a power house 100 ft. x 100 ft., to cost about $12,000.

TOPEKA, KAN.—The Santa Fe, reports say, has awarded a contract to Fuller & Garrett of Leavenworth, for its new freight house, the work to be finished by June 1.

UNION CITY, PA.—The Union City Foundry Company, it is reported, is building a new foundry 50 ft. x 105 ft., with an L addition; also an engine and boiler room 50 ft. x 60 ft. The company is in the market for a lot of second-hand equipment, including a 28-in. lathe, cupola, cinder mill, 40-in. band saw and other machinery. F. W. Burnham is President.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ARIZONA ROADS.—The Transvaal Mining Company will build a narrow gage railroad 16 miles long, from its mines in southern Arizona, to a connection with the Nacozari R. R. at Douglas.

ARKANSAS VALLEY & WESTERN (ST. LOUIS & SAN FRANCISCO).—This company has opened its line from A. V. & W. Junction, Ind. T., to Enid, Okla. T., 119 miles. It will be operated as the Perry District western division of the St. Louis & San Francisco.

BEAUMONT, SOUR LAKE & PORT ARTHUR TRACTION.—It is reported that 11 miles of this line have been completed, from Beaumont, Texas, to Sour Lake. The work has been done by the Beaumont & Sour Lake Construction Company, of which G. W. Meeker, Beaumont, Texas, is President. It is proposed to build a branch from Port Arthur to the Port Arthur docks, three miles. (Aug. 21, 1903, p. 610.)

BRANTFORD & ERIE.—Application will be made at the next session of the Ontario Legislature for the incorporation of a company to build a railroad from Brantford, Ont., south to Simcoe, 25 miles, passing through Waterford. P. A. Dickson, Delhi, Ont., is interested.

BUCKHANNON & NORTHERN.—Work has been suspended on this railroad until the first of April. The road is building from New Brownsville, W. Va., to Belington, 83 miles. About 30 miles of the line have been completed. S. D. Brady, Parkersburg, W. Va., is Chief Engineer. (Dec. 11, 1903, p. 896.)

CENTRAL NEW YORK.—A charter has been granted this company in Delaware. The names of incorporators are not stated, but it is reported that the headquarters of the company will be at Wilmington.

CINCINNATI, BLUFFTON & CHICAGO.—This company has opened its line from Bluffton, Ind., to Pennville, 19 miles. The road is projected from Huntington, Ind., southeast via Bluffton and Pennville to Union City, 66 miles. A. T. Russell, Elgin, Ill., is Engineer. (April 17, p. 289.)

CINCINNATI SUBURBAN BELT.—This company has been incorporated to build a railroad from a point near Red Bank, Ohio, west through Oakley, Norwood, Bond Hill, St. Bernard and Winton Place to Cumminsville, 10 miles. J. M. Wilson, H. E. Langdon, J. M. Crawford and J. E. Blaine, all of Cincinnati, Ohio, are incorporators.

COLUMBUS, GREENSBURG & RICHMOND (ELECTRIC).—This company has been incorporated in Indiana to build an electric railroad from Columbus through Greensburg and Cummersville to Richmond, 100 miles. A. K. Hollowell is President, and C. N. Wilson, General Manager, Indianapolis.

COOPERSTOWN & MOHAWK VALLEY.—This company has been organized to build a railroad from Cooperstown, N. Y., along Otsego Lake, to Springfield Center, 12 miles.

COTTON BELT & NORTHERN.—It is reported that this company will build a branch from Onalaska, Ark., south and east for a distance of 10 miles. The road at present runs from Onalaska to Tulip Creek, 17 miles. L. O. Jackson, Onalaska, Ark., is General Manager.

CUBAN ROADS.—A concession has been granted to a company in Cienfuegos, Cuba, to build an electric railroad from Palmira northeast to Las Cruces, 15 miles, and east to Manicaragua, 30 miles. The company is capitalized at $4,000,000.

DENISON, BONHAM & NEW ORLEANS (M., K. & T.).—The newspapers say that this company will shortly begin work on a line from Bonham, Texas, east to Paris, 35 miles, paralleling the Texas & Pacific between these points. J. W. Petheran, Dallas, Texas, is in charge of the work.

DETROIT, FLINT & SAGINAW (ELECTRIC).—It is reported that this company has completed 12 miles of its line from Saginaw, Mich., southeast to Flint. J. A. Russell, Saginaw, is General Manager. (Dec. 11, p. 896.)

INTERNATIONAL & GREAT NORTHERN.—It is said that this company will build a spur line five miles west of Jewett, Texas.

INTERURBAN STREET RAILWAY (NEW YORK CITY).—It has been announced that this company will soon run surface street cars from the upper end of Manhattan to the Brooklyn bridge, by putting in electrical equipment on Canal street between West Broadway and Centre street. The route (northward) will be up Centre street, through Canal street to West Broadway, and from there through Amsterdam avenue, Broadway or Columbus avenue to the district between Riverside Drive and the west side elevated railroad.

GALVESTON, HUTCHINSON & NORTHWESTERN.—This company is to be organized in Texas, to build a railroad from Galveston northwest to Hutchinson, a distance of about 300 miles. It is stated that a charter will shortly be asked for.

GRAND TRUNK.—Track laying on this company's second line from St. Lambert to St. Johns, N. B., has been completed by Rogers & Taylor, the contractors, and trains are now running regularly between the points named. It is stated that the company will soon begin work on a second track from St. Hyacinth to the St. Lawrence River.

HERBERTVILLE, ST. BRUNO & ALMA.—Application will be made at the next session of the Quebec Legislature for incorporation of a company to build a railroad from Herbertville around the shores of Lake St. John to Ha Ha Bay. The Quebec & Lake St. John R. R. is said to be behind the project.

KENTUCKY ROADS.—Surveys are practically finished for a railroad which the White Oaks Coal Company proposes to build from Cannel City, Morgan County, Ky., to Caney, five miles. Work will be begun shortly. W. B. Smith, Paducah, Ky., is President of the company.

LAKE ERIE TRACTION.—Press reports state that this company has been incorporated in Ohio, to build an electric railroad from Toledo southeast through Fostoria, Carey, Upper Sandusky, Marion and Delaware to Columbus, 120 miles. This line will parallel the eastern division of the Ohio Central. W. H. Drake, G. M. Bailey, C. P. Metcalf and S. P. Douglas are named as incorporators.

LOUISVILLE & NASHVILLE.—Press reports state that surveys are now in progress for a second track between Elizabethton and Lebanon Junction, Ky. It is also reported that this company will change the grade of its line at Muldraugh's Hill. R. Montfort, Louisville, Ky., is Chief Engineer.

MEXICAN ROADS.—A company is being organized to built an electric railroad from Puebla, in the State of Puebla, Mexico, south to Totimehuacan, nine miles. The names of the projectors are not stated.

MONTANA R. R.—Surveys will shortly be made on this railroad for a change of route, in the vicinity of Dorsey, Mont. By the proposed change of route about 17 miles of new line will have to be built, and it is stated that work will be begun early in the spring. The road is now in operation between Lombard, Mont., and Lewiston, 156 miles. F. T. Robertson, Lombard, is Chief Engineer. (Nov. 13, p. 822.)

NACOGDOCHES SOUTHEASTERN.—An officer writes that contracts will shortly be let for the following work: Regrading of nine miles of old roadbed amounting to about 75,000 yds. of earthwork; and 1,100 ft. pile and frame trestle, 14 ft. to 30 ft. high. It is said that contracts for building seven miles of new line will be let as soon as the above work has been completed. W. H. Kimball, Nacogdoches, Texas, is Chief Engineer. (Jan. 1, p. 18.)

NEWTON & NORTHWESTERN.—An officer writes that this line is practically completed from Fraser, Iowa, northwest to Newton, 59 miles. The road connects with the Chicago, Rock Island & Pacific at Metz. Hamilton Browne, Boone, Iowa, is President, and Riggs & Sherman are the Consulting Engineers. (April 24, 1903, p. 304.)

NORTHERN PACIFIC.—Press reports state that this company will extend its Carrington branch from Denhoff, N. Dak., north to Turtle Lake. Connection will be made at the latter point with the extension which the Bismarck, Washburn & Great Falls is building from Washburn north to Turtle Lake.

PENNSYLVANIA.—It has been officially announced that this company intends to build two additional tracks on its New York Division between Trenton, N. J., and Newark, making it a six-track system. It has not been decided, however, when contracts will be let for this proposed work. Surveys are now in progress for a line from Perth Amboy, N. J., to Bay Head.

A press despatch states that the four-track line which this company is to build from Radebaugh to Beatty, 11 miles, will cost between $4,000,000 and $5,000,000. The plans for a tunnel east of Radebaugh will be abandoned and a deep cut will be made at that point instead. Some of the cuts of the road will be 145 ft. deep, and three years will be taken to complete the work. At a point just north of Donohoe a tunnel 1,200 ft. long will be cut through the hill. The contracts for the work will be let in three sections.

PHILADELPHIA, COATESVILLE & LANCASTER (ELECTRIC).—A charter has been granted this company in Pennsylvania, to build an electric railroad from Coatesville west to Strasburg, 20 miles. Connection will be made with the Pennsylvania at Coatesville, and with the Strasburg R. R. at Strasburg. A. H. Swing, Coatesville, Pa., is President.

PITTSBURG & LAKE ERIE.—This company has finished and is now using two new tracks from Groveton, Pa., to Kendall, 2½ miles. This is part of the four-track work which has been going on for the past year. The two new tracks will be used as main tracks, and the two old ones as passing sidings until the spring, when the entire four-track system will be opened for traffic. Signal bridges have been built for the four-track system.

PITTSBURG, SHAWMUT & NORTHERN.—An officer writes that this company has completed a line from Angelica, N. Y., to Bolivar, 23 miles, and from Olean Junction to State Line Junction, two miles. The older lines of the company have been relaid with 85-lb. rails and it is now standard gage throughout. It runs from Shawmut, Pa., to Wayland, N. Y., and connects at the latter point with the Delaware, Lackawanna & Western, and at Hornellsville, N. Y., with the Erie. D. F. Maroney is Vice-President and General Manager.

RALEIGH & CAPE FEAR.—According to press reports, this road, which runs from Raleigh to Lillington N. C., 35 miles, will be extended in the near future to Lumberton, or southeast to Southport. It is stated that surveys will be made at once. J. A. Mills, Raleigh, N. C., is President.

ST. LOUIS, SAN FRANCISCO & NEW ORLEANS.—This company has completed its line from Hope, Ark., to Ashdown, 31 miles, which is a part of the Arkansas & Choctaw railroad recently finished between Hope, Ark., and Ardmore, Ind. T. The entire line was opened for traffic on January 1, and it will be known as the Arkansas & Choctaw Division of the St. Louis, San Francisco & New Orleans. (May 15, p. 351.)

SAN ANTONIO & ARANSAS PASS.—Contract for grading the second 50 miles of the line which this company is building from Alice, Texas, to Brownsville, a distance of 150 miles, has been let to J. P. Nelson, of San Antonio. The first section of 50 miles is practically completed. C. R. Hudson is President. (Sept. 25, 1903, p. 698.)

SLOAN, SAN FELIPE & WESTERN.—Articles of incorporation have been filed by this company in Texas. It is proposed to build from San Felipe to a point near Hagan, 10 miles. Connection will be made with the Atchison, Topeka & Santa Fe at San Felipe. J. H. Sloan, A. E. Sloan, D. M. White, C. E. Spies and others of San Felipe are incorporators.

SOUTHERN.—Press reports state that this company will build a coal road from Virgilina, on the border line of North Carolina and Virginia, northwest to High Hill, eight miles. Surveys are reported completed and it is stated that work will be begun in the spring.

SOUTHERN PACIFIC.—Press reports state that this company is planning to build a connecting link from its main line at Napa Junction, Cal., west to a connection with the Sonoma branch of the California Northwestern, at Shellville, a distance of eight miles.

TEXAS, NEW MEXICO & WESTERN.—An officer writes that work will shortly be begun on this proposed road from Dallas, Texas, west to Roswell, N. Mex., 300 miles. The authorized capital of the company is $500,000. E. P. Spears, Dallas, Texas, is President, and M. J. Healey, General Superintendent. (Dec. 4, 1903, p. 878.)

TREMONT & GULF.—This road has been extended during the past year from Lindsay Junction, La., to Eros, 13 miles. Work is now in progress on a further extension towards Alger, 16 miles. W. C. Collier is Vice-President and General Manager.

TUSCALOOSA BELT.—Contracts for grading the extension from Tuscaloosa, Ala., to Holton, five miles, are reported let to Wm. Troxey and Guy Hard. It is stated that work will be begun at once. (Dec. 18, 1903, p. 912.)

UTAH EASTERN (DENVER & RIO GRANDE).—This company has amended its articles of incorporation so that the line will now run from Heber through Duchesne County, and Daniels Pass. It is stated that the road will eventually be extended into the Indian Reservation.

WESTERN MASSACHUSETTS ELECTRIC RAILWAY.—This company proposes to build from Westfield, Mass., west to Hudson, N. Y. The line will pass through Chester and Lee in Massachusetts, and through Mellenville, Philmont, Ghent and Chatham in New York State. The distance between Westfield and Hudson by the Boston & Albany is 86 miles. The route of the proposed electric road is shorter, but probably more hilly.

GENERAL RAILROAD NEWS.

BALTIMORE & OHIO.—This company has purchased the Belington & Beaver Creek R. R., which runs from Belington, W. Va., south to Weaver, seven miles. It will be operated as the Beaver Creek Division.

BUTTE COUNTY.—This road, which has been practically completed from Chico, Cal., to Sterling City, 30 miles, has been taken over by the Chico & Northern. The latter company was incorporated in California in November and is controlled by E. H. Harriman. (Nov. 20, 1903, p. 838.)

CANADA SOUTHERN.—It is announced that application will be made at the next session of the Dominion Parliament for an act confirming the following: The new lease from the Canada Southern to the Michigan Central, dated Aug. 15, 1903; the trackage agreement between the Canada Southern, the Michigan Central and the Pere Marquette; the right of the Canada Southern to acquire the railroad franchises and undertakings of the Sarnia, Chatham & Erie, or to amalgamate with that company; and the conferring on the Leamington & St. Clair Ry. Co. the powers it possesses under the Acts of the Province of Ontario relating to the company to sell its railroad or make agreements with the Canada Southern. (June 12, 1903, p. 416.)

CHICO & NORTHERN.—See Butte County above.

FONDA, JOHNSTOWN & GLOVERSVILLE.—This company, which operates a railroad from Fonda, N. Y., to Northville, 26 miles, has bought the property of the Adirondack Lakes Traction Company, a trolley railroad from Gloversville to Mountain Lake. (Jan. 30, p. 92.)

INDIANAPOLIS SOUTHERN.—A mortgage for $5,000,000 has been filed by this company with the United States Mortgage & Trust Co. of New York, as trustee. The mortgage, which is a first lien, will cover an issue of $5,000,000 in 5 per cent. gold bonds, and was authorized on Aug. 19 at a meeting of the stockholders. The company is building a railroad from Indianapolis to Sullivan, Ind., 140 miles, and grading has been about half completed. (See Railroad Construction, Nov. 6, 1903, p. 804.)

INTERURBAN STREET RAILWAY (NEW YORK).—See New York City Railway below.

MIDLAND VALLEY.—This company, it is reported, has purchased the Muskogee Southern, which has just been completed from Muskogee, Ind. T., to Russell, 22 miles. The line is now being extended to Fort Smith, Ark.

NEW YORK CITY RAILWAY.—Supreme Court Justice Fitzgerald has granted an order allowing the Interurban Street Railway Co. to assume the name of the New York City Railway Co., on and after Feb. 10 next. (Nov. 20, 1903, p. 838.)

NORTHERN CONSOLIDATED HOLDINGS COMPANY.—This company, which has an authorized capital of $8,000,000, has been granted a charter by the Ontario Government. The company has been formed in connection with the transfer of the controlling interest in the Great Northern of Canada, and subsidiary roads, to Mackenzie & Mann. It will take over the securities of the Chateaugay & Northern, Montfort & Gatineau Colonization and the Great Northern of Canada.

PITTSBURG, VIRGINIA & CHARLESTON.—At a special meeting of the stockholders on Dec. 31, it was voted to issue bonds to the amount of $6,000,000. These bonds will be a first mortgage on all the railroad property and franchises of the company, and will be used in part for refunding purposes. (Nov. 13, 1903, p. 822.)

UNADILLA VALLEY.—This road, which runs from Bridgewater, N. Y., to New Berlin, 19 miles, was sold at auction at Utica on Jan. 4. The road was bought by interests representing the first mortgage bondholders. It is stated that the company will be reorganized and that extensions will be built from Bridgewater to Utica, 18 miles, and from New Berlin to Oneonta, 32 miles. (Dec. 18, 1903, p. 912.)